VOL. 79 No. 2016
1 MARCH 1958

CHEMICAL AGE

BOUVERIE HOUSE · 154 FLEET STREET · LONDON · EC4

Telephone: FLEet Street 3212 (26 Lines)
Telegrams: Allangas - Fleet - London

Editor M. C. HYDE
Manager H. A. WILLMOTT
Director N. B. LIVINGSTONE WALLACE

Midland Office
Daimler House, Paradise Street, Birmingham. [*Midland* 0784-5]

Leeds Office
Martins Bank Chambers, Park Row, Leeds 1. [*Leeds* 22601]

Scottish Office
116 Hope Street, Glasgow, C2. [*Central* 3954-5]

IN THIS ISSUE

Arginine Production	388
New Method of Gas Production	389
Distillates	390
Bradford Symposium	391
Terylene Patent Application	392
First Humphry Davy Lecture	394
Emeleus on Boron Hydrides	394
Chemical Prices in 1957	395
Analytical Review	396
Gaseous Effluents	397
Overseas News	399
Equipment Review	401
Commercial News	404
Market Reports	405
Stocks and Shares	405
People in the News	406
New Patents	408
Trade Notes	409
Diary Dates	409

Annual subscription is: home, 52s 6d, overseas, 60s, single copies 1s 6d (by post 1s 9d)

THE AMERICAN SCENE

REPORTS from the US during the last few weeks indicate the anxieties felt by industrial concerns in that continent. Unemployment reached 4½ million in January or 5.8 per cent of the US labour force, and this figure is expected to be higher still for February.

With the deepening US recession, it is of interest to examine the state of the chemical industry there and to consider the problems besetting it. A survey by *Chemical and Engineering News*, 1958, **36**, No. 6, 21, indicates that for those chemical companies whose preliminary figures have been announced, the same economic pressures which were present in 1956, continued in 1957. Inflationary pressures have caused further increases in the cost of labour and materials, which could not be redeemed by increases in selling prices. Lower earnings have been reported by Union Carbide Corporation, Allied Chemical and Dye Corporation, and Monsanto Chemical Co.

A marked drop in sales occurred during the last quarter of last year due to slackening in the overall economic activity, and a sharp fall was noted in December last. Monsanto, for instance, have reported a 3 per cent fall in fourth quarter sales compared with 1956 levels. Hercules Powder Co. also report a noticeable fall in December sales, and January sales are stated to be about 8 per cent behind those of the previous year. In fact, this company's president in his annual report predicts a 5 to 10 per cent drop in earnings for this year.

Union Carbide have noted a steep drop in demand for some products in the fourth quarter of 1957. Overall the sales for this period were about 1 per cent down, but profits fell by almost 25 per cent. Perhaps even more emphatic is the very recent announcement by this company that they are postponing the building of research and office facilities in New York owing to 'worsening business conditions' (*Chemical Age*, 22 February, p.359).

On the whole, expenditure on construction and research is not being withheld. Research in particular is felt to be vital to the continent's future economy. Throughout 1957 US chemical companies spent record sums for buildings, plant, equipment and improvements to existing set-ups. To some extent this has undoubtedly affected earnings in 1957. Expenditure in 1958 for plant and equipment is expected to proceed along the decline forecast by last year's surveys. Reasons for this are the excess capacity now available in certain sections and lack of confidence on the part of US businessmen evolving from the reports of the recession.

The really cheerful section of US chemical industry appears to be that involving the ethical pharmaceutical producers, who have had record-breaking results, with improved margins for the year. Business in this sector continues to be good with encouraging sales in the first few weeks of this year.

US pharmaceutical producers are reported as saying that these results are due to heavy research budgets over the past few years. Indeed, *Chemical and Engineering News* record that half the increase in Eli Lilly's sales last year resulted from three new products which were introduced during the year. It appears, too, that further expansion for pharmaceuticals is predicted for this year, with forecasts that sales will be up 8 to 10 per cent and that

earnings will show an additional gain of at least 5 per cent.

The most recent *Chemical and Engineering News* survey (1958, **36**, No. 8, 25) indicates that employment in chemicals and allied products is reaching a new low. In the mid-west some companies report business to be as good as ever, with employment unchanged, or even increased sales and labour forces. Basic chemical producers generally appear to be finding business conditions are stable. In the New York area chemical employment is better than in other industries. The largest cuts in chemical plant employment are to be found in textile fibre units.

In the south, employment lay-offs are described as 'limited and spotty.' Immediate efforts are being directed to keep everyone working, either by shifting personnel to different jobs and using some production personnel in maintenance work.

Some companies in this area are revising estimates this year and will be cutting down. New construction is being 'stretched out.'

'Cautious optimism' is said to characterise the opinion of the Pacific coast chemical industry. Some temporary lay-offs and plant shut-downs have occurred, but these have been or are expected to be short.

Regarding chemical company research organisations, the picture is stated to be even a little brighter. Research directors are maintaining their carefully built up teams and all are said to expect to maintain the *status quo* for the coming year.

US chemical industry is obviously concerned about the European Common Market. Reports and surveys in *C. and E. News* have, since last year, emphasised to the US chemical manufacturers that the ECM is a big chemical market.

Assistant Secretary of State, Mr. Thomas C. Mann, at a recent New York meeting on ECM (*C. and E. News*, 1958, **36**, No. 7, 28) said that the US State Department believed that the ECM would ultimately benefit outside countries. But this optimistic view is not shared by others. A spokesman for Merck Inc. takes note of the tariffs on finished goods, moderate tariffs for semi-finished products and relative freedom for raw materials. He holds the view that US chemical companies should 'go basic' in Europe.

Library of Congress senior specialist, Howard S. Picquet, considers that preferential duties will in due course operate against all US exports to the ECM, particularly for certain chemicals such as speciality products. His view is based on the maximum rates already agreed for ECM's common tariff such as—most organics not to exceed 25 per cent; most inorganics not to exceed 15 per cent; and low rates for chemical raw materials to strengthen the position of European chemical manufacturers.

The larger European chemical companies are evidently regarded by Picquet with a great deal of concern, especially in their research and development potentialities. German chemical companies, in particular, with their large-scale production are seen as the most powerful US competitor for ECM markets, notably France and Italy. With the coming tariff picture, therefore, Picquet believes that in the short run, at least, the US chemical industry stands to lose from ECM. However, he, too, looks to US chemical manufacturers to 'jump the tariff barrier' in Europe by establishing subsidiaries there. Also spurring on this idea is the benefits which the US chemical industry sees as resulting from a free trade area in Western Europe.

Since the UK is included in the proposed free trade area, we believe that more US chemical and allied concerns will be attempting to set up subsidiaries in this country or will join forces with suitable UK companies. What must also be borne in mind is the growing US interest in France and Italy. These two countries, we feel, cannot fail to appeal to the US. A main factor would undoubtedly be the large natural gas reserves just being exploited in both these countries.

ARGININE PRODUCTION

Although arginine was isolated from related amino acids more than 50 years ago difficulties in separation (limited to batches of 10 to 20 lb.) have hindered extensive research and have made the product costly.

Now an ion-exchange process worked out by Mr. Norval Barker of General Mills of the US after four years of research has led to the production of arginine on a large scale. The process can also be used to produce L-lysine and can be adapted to make several other amino acids.

Basic steps in the process are the hydrolysis of protein such as gelatin, blood meal, or soyabean meal and separation of arginine from the resulting mixture of amino acids. It is in the separation of the arginine from other amino acids that difficulties have previously arisen. General Mills say they have overcome the difficulties by the use of ion-exchange resin. At the present time, however, it is not known which resin is used or how the resin works. General Mills claim that arginine of 99 per cent plus purity is obtained.

Arginine and lysine are obtained as co-products from this process. The amounts of the two amino acids formed vary with the protein raw material. Gelatin, it is stated, produces a larger proportion of arginine, blood meal, a larger proportion of lysine, and soyabean meal gives equal quantities of both.

Initial price of the free base is $41 a lb. and $27 a lb. for arginine monohydrochloride. Although these prices still seem high, they should be compared with present US prices of $90 a lb. for the free base and $38 a lb. for the salt.

General Mills state that they will not carry out direct marketing of arginine but will offer it to US pharmaceutical houses. The company will also produce argininium glutamate.

PHOSPHORUS-CONTAINING FAT

A PHOSPHORUS-CONTAINING fat which has eluded active research for the past thirty years has recently been identified by research workers of the department of agricultural and biological chemistry, University of Pennsylvania. Compounds of this group, the phospholipids, make up a major fraction of nerve tissue, of seeds, and of the green chloroplasts of plant cells and many other structures.

The new phospholipid is called phosphatidyl glycerol. Its presence in a wide variety of plant leaves as well as in animal liver fats has been reported by Professors Bunji Maruo and Andrew A. Benson at the International Conference on the Use of Radioisotopes in Scientific Research.

Identification of this lipid promises to resolve a tangled array of information on the phospholipids, and has already provided explanation of some unusual experimental results on the synthesis of sugars by plants.

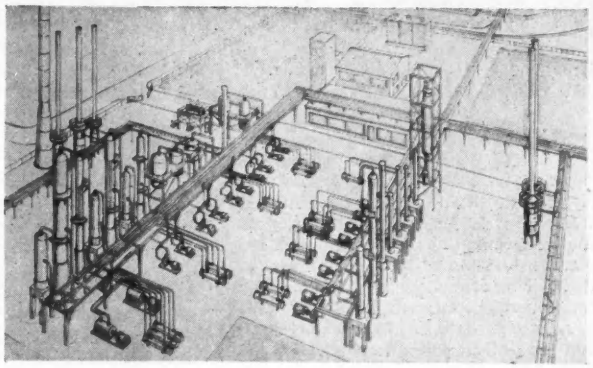
Phosphatidyl glycerol has two molecules of glycerol in contrast to normal fats which have one. It has two fatty acids, the constituents of soaps, and one molecule of phosphoric acid which holds the two glycerols together. These are all well-known components of fats but exist in such a simple and symmetrical arrangement that the usual chemical methods were unable to detect the presence of the new compound.

Clue to the identity of the phosphatidyl glycerols was found in green algae by Maruo and Benson in the form of diglycerophosphate, the backbone of the phosphatidyl glycerol molecule. The algae accumulated large amounts of diglycerophosphate which stimulated curiosity and resulted in its identification. Because its structure was so simple and unexpected its identification was relatively difficult.

During the identification work only minute quantities of the compounds were used. Their properties and amounts were measured by radiocarbon- or radiophosphorus-labelled atoms introduced into the plants before their extraction.

NEW METHOD OF GAS PRODUCTION

Cheaper, More Flexible with Lower Toxicity



A break-away from the traditional conception of a gasworks is shown in this perspective drawing of the H and G plant

UNDER a contract signed this week, Humphreys and Glasgow Ltd., Humglas House, Carlisle Place, London SW1, are to build a £2 million gas plant at Partington, near Manchester, for the North Western Gas Board. Using a completely new method of gas production, the plant will not look like a gasworks but will resemble a modern chemical plant. It is expected to be in operation by the beginning of 1960.

Advantages claimed for the new method, which it is thought may eventually help to solve the UK's low grade coal problem, are cheapness, flexibility in raw materials, low toxicity of the gas, freedom from sulphur compounds and availability at high pressure.

High pressure will allow the gas to be transmitted economically over long distances without compression, so that the production plants can be sited where raw materials are cheapest.

One of the main objects of the Partington plant is to hasten full-scale development of a new process to produce gas by hydrogenation of oil or coal. This process was first envisaged by Dr. F. J. Dent, director of the Gas Council's Midland Research Station at Solihull, and it is based upon experimental work carried out by his team over many years.

Town's gas will be produced in the plant by a sequence of continuous automatically controlled processes, which have been designed by the process engineering department of Humphreys and Glasgow, under its technical director, Mr. N. H. Williams, in collaboration with the development department of the North Western Gas Board.

A wide variety of different grades of oil can be used, taking advantage of fluctuations in the price of oil refinery by-products. Later it is intended that low-grade coal will take the place of oil.

The installation at Partington will have a capacity of 7.5 million cubic feet of gas per day. It is looked on by the gas industry and the government as a full-scale demonstration unit to prove the efficiency and economics of the new process.

Gas made in this demonstration plant will cost roughly the same as gas produced by conventional methods, but for bigger plants considerable reductions in both capital and operating expenditure would cut costs sharply, it is believed.

The gasification system of the new Partington plant will comprise the production and purification of hydrogen in excess of 90 per cent purity by the gasification of oil (and at a later stage, coal) at a pressure of 400 p.s.i. with oxygen and steam, and the use of this hydrogen for the production of rich gas by hydrogenating further oil or coal to produce gas of about 600 BThU/cu. ft. calorific value.

The rich gas is then diluted to the required calorific value by the addition of nitrogen.

Advantages of the system are that both the specific gravity and the carbon monoxide content of the gas are under control. In this first installation it is intended that the carbon monoxide content should be at least as low as 1.5 per cent or under, thus greatly reducing the toxicity of the gas. The organic sulphur content will also be low.

The process used for the production of hydrogen is that of the Texaco development Corporation, for which Humphreys and Glasgow are licensed contractors. In this process, oil is gasified by reaction with steam in oxygen at a temperature of approximately 2,500°F, producing a mixture of carbon monoxide and hydrogen, together with a small amount of carbon dioxide and traces of methane. A controlled amount of carbon black is formed which is removed from the gas by a water wash which simultaneously generates the steam necessary for reacting with the carbon monoxide to form hydrogen. The water wash is cooled and filtered free of carbon and returned to the system.

After leaving the scrubbers the gas is passed to the carbon monoxide conversion plant, where the shift reaction is carried out over a sulphur-resistant catalyst. The carbon dioxide and hydrogen sulphide in the gases leaving the shift converters are removed by absorption in a solution of potassium carbonate at a temperature of approximately 250°F using the Benfield process, for which Humphreys and Glasgow are also licensees. The absorbant solution is regenerated by reducing the pressure and stripping with steam derived from the hot gas stream coming from the conversion plant.

The gas leaving the Benfield absorber, consisting of at least 90 per cent hydrogen, is preheated and fed into the hydrogenator together with preheated oil which is converted at high temperatures essentially to methane together with a proportion of ethane. The hydrogenation is the key section of the process and was conceived and developed to the pilot stage by Dr. Dent at Solihull Research Station. The gases leaving the hydrogenator contain benzene and highly aromatic compounds which are removed by condensation and scrubbing with circulating oil.

The resultant gas, free of benzene, is then diluted with nitrogen to bring the gas to the required calorific value, and density.

Reader Enquiry Service

This week Chemical Age is instituting a new Reader Enquiry Service, designed to give further information on equipment, apparatus, chemicals, etc., mentioned in this issue, whether in the editorial text or in the advertisements. To take advantage of this free service readers should complete the form on page 416, detach the page complete, and fold it as indicated. The page then becomes a reply-paid folder.

BOC Could Expect to be Involved in Thor

FUEL for the US ballistic missiles (Thor) to be based in the UK will be a mixture of kerosene and liquid oxygen. Regarding the latter British Oxygen Co. say that there are two alternatives possible. Either the oxygen could be manufactured on the site or it would be necessary to provide adequate storage facilities.

Asked if they expected to play any part in the project British Oxygen said 'they could reasonably expect to be involved'.

Sulphuric Acid Plant at Billingham

The general purposes committee of Billingham-on-Tees Urban Council has approved the erection of a sulphuric acid plant at the local works of British Titan Products Ltd. It is understood that the plant will cover between 20,000 and 30,000 sq. ft.

★ SHOULD chemical industry consultants advertise their services? 'No,' says the Royal Institute of Chemistry in a statement in the *Journal*, (January, p. 100) confirming the report of the ethical practices committee which was adopted by the RIC council last year. 'Yes,' say two correspondents writing in the same issue of the *Journal*. The Institute says that the general principle that consultant members should not advertise their practices is of long standing and has been accepted by consultants without complaint.

The question recently raised is whether an exception should be made to cover the 'business card' type of advertisement. The committee feels that no such exception should be made. But Mr. J. R. Cracknell, who is not motivated by any 'connection with the consulting or advertising professions' views the report with horror. He is dismayed that chemists should be 'so completely out of touch with the needs and practices of the day.'

Mr. Cracknell asks 'What is a consultant, who instals a costly new electron microscope to do? Is he to lurk in pubs frequented by potential customers, draw them into a corner and tell them the merits of his new toy and then ask them not to tell the RIC that he had told them?' He adds that single insertion of a trade card advertisement and an entry in the Directory of Independent Consultants is not likely to keep the new consultant from starvation. Mr. W. H. Stevens in the same issue refers to the committee's view that there was no evidence that the general body of consultants wished to see a change in policy. He asks what was the basis for that categorical statement, considering that the 'general body of consultants' had not been consulted by the committee.

★ THE RIC ethical practices committee is, of course, in step with all the other learned and qualifying societies. Certainly very few consultants today would wish to break with them by advertising, but that is not to say that many of them would not like to promote their services. At present this tends to revolve around the costly business of entertaining potential clients—to reach 10 business contacts in this way could cost him well over £50. A discreet trade card in the appropriate journal would not cost him more than about £5.

It has been common practice in the US for consultants to advertise by means of trade cards since before the last war The societies in this country possibly feel that to sanction that form of advertising might well lead to an undignified advertising scramble. It is worth noting that that has not happened in the US, where those engaged in commerce and industry are far more publicity conscious.

A number of consultants in this country, admittedly few, go to the expense and trouble of producing bulletins about the progress of their work. This is a costly business and many would look on it as a form of advertising.

There is no doubt in my mind that a moderate relaxation of the present strict ban on advertising would be greatly to the advantage of the professional consultant. If limited to the trade card type of advertisement there would be no danger of any undignified scramble into other forms of advertising media.

★ CRITICISM by the Institution of Professional Civil Servants of the appointment announced last week, as Comptroller-General of Patents, Designs and Trade Marks, of Mr Gordon Grant, an under-secretary of the Board of Trade has brought a reply from the BoT.

General secretary of the institution, Mr. Stanley Mayne, had said that for over 30 years it had been regarded as essential that the Comptroller-General should have a substantial scientific background. Now the President of the Board of Trade no longer thinks this necessary.

The Board of Trade states that the President was satisfied that the man at the head of the Patent Office should be someone of 'broad, general administrative experience rather than a specialist in some aspect of its work.'

★ THE CONTRACT awarded to British Thomson-Houston for the largest germanium rectifier (see p. 395) for use in chlorine production by Associated Ethyl, reminds me that semi-conductor cells of the germanium type were first used in England for power rectifiers of appreciable magnitude when BT-H made and installed a 300kW, 270 volt, 1100 amp. equipment for the electrolytic production of hydrogen. That was in 1953 and since then BT-H have built a considerable number of equipments for a wide range of voltage and current outputs.

Germanium rectifiers offer a simple means of a.c. to d.c. power conversion and, even when the d.c. output voltage is relatively low, an efficiency is obtained considerably higher than is possible with other types of converting plant. The efficiency depends to a certain extent on the d.c. output voltage, but a rectifier efficiency of 98 to 99 per cent is not unusual, making possible an overall efficiency (including transformer) of 96-97 per cent.

Since the voltage which can be applied to a single cell is limited and cells must be connected in series for higher voltage outputs (thereby increasing the size and cost of the rectifier) the principal field for the use of germanium rectifiers is, at present, for d.c. voltages below 500.

In a special semi-conductors factory, BT-H refine germanium crystals until impurities represent less than one ten-millionth of one per cent.

★ US HOG RAISERS, in their efforts to reduce anaemia among their herds, are an important new source of dollars for the UK chemical industry. To cope with what they describe as a tremendous demand, Benger Laboratories Ltd., of Holmes Chapel, Ches, have organised a thrice-weekly air lift to Chicago carrying supplies of their anti-anaemia injection Imferon, an intra-muscular iron preparation.

Three times a week, shipments are flown from Manchester. Each consignment weighs more than two tons and contains 300,000 doses, worth over $70,000. British pig farmers have been using Imferon (veterinary) for 18 months, but this UK-discovered drug has been available to the US for only six months.

★ A CHEMICAL engineering concern, young in years and in ideas is that of William Openshaw Ltd., of Roundthorn, Wythenshawe. Founded in 1939 by the present managing director, Mr. William Openshaw, it has seen in its relatively short existence, the many outstanding developments that have taken place in plant design since the last war.

Before starting on his own account, Mr. Openshaw had, on behalf of Joseph Taylor of Bolton, carried out much of the lead work in the original Ruabon works of Monsanto Chemicals. The urge to operate on his own was strong and from 1921 to 1939 he offered his services in the wider field of general and domestic plumbing, gaining valuable business experience.

Specialists in chemical plant fabrication in lead, the firm has in recent years been increasingly involved in the use of plastics, particularly p.v.c., as construction materials. In this new endeavour, William Openshaw operate under agreement with the Chemical Plant and Sulphur Extraction Co., who act as technical consultants, leaving Openshaw to perform actual fabrication.

The background of this firm and the services it offers are outlined in a new brochure published to mark the opening last year of new premises.

Alembic

BRADFORD PAPERS ON CHEMISTRY OF PLASTICS

Dr. Haslam on Analytical Problems

A PROGRAMME of four papers was heard at the symposium on 'The chemistry of plastics' held at the Bradford Institute of Technology on 14 and 15 February. Organised by the Bradford Chemical Society in conjunction with the institute's department of chemistry and dyeing and the Yorkshire Council for Further Education, it was opened by Dr. W. Cule Davies, chairman of the council's chemistry advisory committee, who presided for the first lecture.

The introductory lecture, 'The chemistry of plastics and polymers' was given by Professor C. E. H. Bawn, Grant-Brunner professor of inorganic and physical chemistry, Liverpool University. At the other three lectures, the chair was taken by Dr. E. G. Edwards, principal of the Bradford Institute of Technology. These papers were: 'New polymers and plastics', by Dr. R. R. Smith (BX Plastics Ltd.); 'Applications of plastics', by G. Campbell (ICI Ltd., plastics division); and 'The analysis of plastics,' by Dr. J. Haslam, chief analyst of the ICI plastics division.

Summaries of the papers by Professor Bawn and Dr. Smith will be published in our next issue.

Dr. J. Haslam in 'The analysis of plastics', drew attention to simple tests, as for example, the determination of elements, solubility, heating tests and special tests such as the anthrone test for cellulose, the morpholine test for polyvinyl chloride etc., which were of use to the analyst. There were useful schemes of analysis such as that of Gladstone Shaw and valuable information was to be found in Roff's book 'Plastics, Fibres and Rubbers'.

It must be realised, however, that in actual practice the questions submitted to the analyst were rarely simple: in general he was not asked whether a sample was nylon or related polymethyl methacrylate but he might be asked which particular nylon or related polymer he was dealing with.

Dr. Haslam then went on to describe the identification of various nylons and related polymers. He drew attention to the synthesis of 66 nylon and to its breakdown by hydrolysis and the ease of hydrolysis of various nylons. He described the methods of isolation of nylon hydrolysis products and the separation of mixed hydrochlorides and mixed acids. He indicated how infra-red spectra were used in this connection and pointed out certain limitations in this form of test.

Polymers derived from diaminodicyclohexamethane were described as well as the resolution of mixtures of the dihydrochloride of this amine with hexamethylene diamine dihydrochloride, the hydrochloride of aminocaproic acid.

Demonstrations were given of a simple chromatographic method for the examination of commercial nylons which was, incidentally, useful with copolymers where the proportion of one of the constituents might be quite small.

He drew attention to the electrophoresis work of Dr. Gross and indicated that such work might prove to be very valuable in the examination of the various hydrolysis products of nylon. In connection with polyvinyl chloride, Dr. Haslam drew attention to interesting new and novel plasticisers. He pointed out the difficulties which arose in the examination of polyvinyl chloride compositions when such polymeric plasticisers as polypropylene adipate were present. In addition, he gave details of a rapid spectrophotometric method of determination of lead in polyvinyl chloride compositions. He went on to describe methods for the examination of polymethyl methacrylate and related polymers, in particular referring to the application of the vacuum depolymerisation method. He gave particular attention to the new methods involving gas-liquid chromatography which were now available for the examination of depolymerisation products and of organic liquid mixtures of all descriptions.

Considerable attention was directed to the determination of ethoxy compounds in the presence of large amounts of methoxy compounds in certain polymers and the application of the gas-liquid chromatographic test to the examination of solvents from all kinds of plastics adhesives was dealt with at great length.

Analytical procedures were presented for the analysis of polycarbonates and finally Dr. Haslam gave a short account of the applications of automatic titrimetry in the general work of a plastics analytical laboratory.

Applications of Plastics

Discussing 'Applications of plastics' Mr. G. Campbell said that the production of primary plastics materials in the UK was now some four times that for 1948. This expansion had been the result of two main factors: first, the development of new materials from pilot plant to full production status and second, the development of applications arising from new thinking about established polymers.

Both of these aspects were reviewed by Mr. Campbell in four specific fields in which major application development had taken place during the last ten years. These fields were: telecommunications, packaging, transport and building.

Dealing with plastics in telecommunication, Mr. Campbell said that the development of new plastics insulating materials had greatly assisted the production of very small radio components capable of running at high temperatures. Polyester film such as Melinex had been used in miniature capacitors, in choke or transformer insulation and in special cables. For even higher temperatures, p.t.f.e. might be used, as in moulded valve holders, crystal holders, led through insulators, etc., and as helical membranes in cables.

In packaging, polythene-coated paper was of increasing importance in the development of disposable packages for liquids. While polythene was the material most commonly associated with plastics bottles, other plastics were being used in increasing quantities, where greater rigidity and internal pressure resistance were required. Sterilisable bottles in nylon and high density polythenes were of particular interest and recent US reports indicated that a new polymer of formaldehyde now under development would prove suitable for aerosol bottles.

In transport, phenolics predominated in engine parts, but nylon was being used for timing chain tensioners and cooling fans. New materials now being developed suggested that plastics bearings in car engines might yet be achieved.

Symposium Display at Bradford Institute

The exhibition organised by the Bradford Chemical Society and held at the Bradford Institute of Technology on the 14 and 15 of February was considered by visitors to be one of the best which has been staged there.

This year, with the symposium including plastics, there was a definite 'plastics' interest, and this was evidenced by the varied display by the plastics division of Imperial Chemical Industries Ltd. In a comprehensive review of the division's products, examples were shown of products manufactured from Darvic, Melinex, Diakon, Welvic, Perspex, Mouldrite, Fluon, Butakon, Alkathene and nylon.

There was, too, a display showing the use of plastics in industry and plastics in the home—a prestige display which did not include the name of any manufacturer but was nevertheless a very good one.

Reynolds and Branson Ltd., of Leeds 6, had on view a wide range of their products, including the R. and B. Regain apparatus, which is a portable unit operating on 200–250v. a.c. and which gives accurate thermostatic control of the air stream, and is adjustable between 70° and 140°C. This company's rapid oil extraction apparatus and thickness tester were included among the instruments on view. New measuring

instruments were displayed by Electronic Instruments Ltd., of Richmond, Surrey, and Davey and Moore Ltd., of Enfield, Middlesex, showed laboratory and scientific glassware.

Bakelite Ltd., of London, had a good display, illustrating the range of the company's products, and Glen Creston Ltd., of Stanmore, Middlesex, in a diverse display included a micro hammer mill for rapid analytical grinding. The company reports that only 30 to 120 seconds are required for disintegration of the majority of samples. Another piece of apparatus exhibited was a constant temperature cabinet and incubator at a low price—£19 10s. This is known as the Incubaril.

Pumps used for viscous materials were shown by Barclay Kellett and Co. Ltd., of Bradford. The range on display included the Triton and also rotary pumps.

A. M. Lock and Co. Ltd., of Oldham, exhibited a variety of products including instruments manufactured by W. G. Pye and Co. Ltd.

Some samples from their range of balances were included on the stand of Oertling Ltd., London.

Ralph Cuthbert Ltd. had on view a wide range of their glassware and Shaw's Instruments, of Bradford, included several of their better-known instruments for moisture determination in the wool industry.

Shirley Institute Reports on Greater US Willingness to Set Up Pilot Plants

'AMERICANS are more ready to "have a go" by building pilot plants. This is a costly business, but they do not seem to mind if the move is not a success,' said Dr. A. R. Urquhart, an assistant director of the Shirley Institute at a conference on 18 February. This was in contrast to the UK attitude. But they did not have research associations such as we had, he added.

'There is a greater willingness there to accept new knowledge when it can be applied by the industrialists,' he went on. Americans were much more ready to spend a lot of money at an earlier stage.

Dr. Urquhart, together with Dr. J. Honeyman, head of the chemistry department, Shirley Institute, has just returned from the US.

It appeared that in the cotton textile industry the Americans were faced with a drastic fall in recruitment, but the view was expressed by Dr. Urquhart that the large chemical companies, who were themselves producing fibres, compensated for this to a good extent because they were themselves engaged in research and development. There was no lack of recruits to the chemical industry in the US.

There were indications that we in the UK were much more ahead in the finishing side of the industry. An indication was in flameproofing. The Americans had developed flameproofing, but not to the same extent commercially as in the UK simply because they were not able to finish their products satisfactorily.

Asked the reason for the British supremacy, Dr. Urquhart said that it was certainly not because we had superior machinery to the Americans. Probably experience and 'know how' had a lot to do with it. One large finishing organisation in the States was prepared to send a team off to this country to learn how to finish.

It was very clear in the US that the American textile industry relied on the big chemical firms for a lot of their research.

Asked about a recession in the US, Dr. Urquhart said that his own view was that research by big firms like Du Pont would not be cut down by any minor recession. He felt that many Americans were inclined to worry a little about recession, but contrived to cover their worries by a show of boisterous optimism.

Concerning instrumentation, he said that this had developed considerably in the US, where there was a very good scientific instrument industry.

The value of this industry was that it provided a first-class after-sales' service.

This was in contrast to the UK, where firms sometimes forgot that after developing instruments they required servicing.

Dr. Honeyman observed that they had an example of lack of servicing at the Shirley Institute. An expensive instrument was not in use at the present time simply because they were unable to have the machine serviced.

This sort of thing, he suggested, would not have occurred in the US.

Asked for further details, Dr. Honeyman said that the instrument was manufactured by a well-known firm. After selling instruments, the Americans went out to service them to a standard never seen in this country.

It is understood that the instrument at Shirley has not been in operation, due to need of servicing, since before Christmas last.

At Shirley Institute conference, l to r seated, Dr. A. R. Urquhart, Dr. D. W. Hill and Dr. J. Honeyman; standing, K. E. Lewis

Application for Terylene Patent Extension

APPLICATION of the Calico Printers' Association to extend the life of its UK Terylene patents has now been accepted by the Comptroller of Patents (see CHEMICAL AGE, 30 November, 1957, p. 892). The patents in question are the main patent No. 578 079 which covers the manufacture of highly polymeric substances, with a patent of addition, No. 603 827 for making artificial fibres from these substances.

The UK licence is held from CPA by Imperial Chemical Industries Ltd., who are understood to be fully supporting the application.

Objections to the extension have to be lodged by April 19. The longest period for which the patents can be extended is 10 years.

Preliminary Investigations on Silicon Boride

FROM the basic research branch of the research and development division, Carborundum Co., New York, US, Carl F. Clive reports (*Nature*, 1958, **181**, 476) that single crystals of silicon boride (SiB_6) have been prepared by fusion of the elements. Wet chemical analysis after removal of excess silicon is stated to agree with stoichiometric values for the compound SiB_6. Density (by pycnometer methods) was 2.45 g./c.c. and from this it has been determined that the unit cell contains 42.7 molecules.

Preliminary investigations have indicated an orthorhombic unit cell. The structure is stated to be quite complex.

Electrical, hardness and melting point determinations indicate that SiB_6 has interesting physical properties, which are being investigated.

PTFE Fabricators and the Plastics Federation

The question of providing improved facilities for fabricators of polytetrafluoroethylene is to be discussed at an open meeting to be held in the offices of the British Plastics Federation, 47-48 Piccadilly, London W1, at 2.30 p.m. on Tuesday, 4 March. It has been suggested that a separate section, or a special technical committee, should be formed within the fabricators' group of the federation to enable p.t.f.e. fabricators to discuss their mutual problems and in particular to consider the preparation of standards.

Determination of Polyesters in Methacrylate Copolymers

A METHOD has been devised by Dr. J. Haslam, Mr. J. B. Hamilton and Mr. A. R. Jeffs of plastics division, Imperial Chemical Industries Ltd., Welwyn Garden City, for the determination of poly (ethyl esters), such as poly (ethyl acrylate), in methyl methacrylate copolymers and is reported in *Analyst*, 1958, **83**, 66.

These workers' efforts were directed to finding a simple process by which, for example, the methoxyl group of poly (methacrylate) could be converted to methyl iodide in very high yield. Essentially the process is based on the method for determining alkoxy groups in cellulose ethers(1) with these differences: (a) nitrogen was used in conjunction with a mercury lute and a flowmeter as the sweeping out gas, instead of carbon dioxide; (b) the spiral scrubber contained 4 ml. of 25 per cent w/v sodium acetate solution, and (c) the bromine solution absorber was modified so that a second bromine solution absorber could be fitted in series, as a precautionary measure.

Phenol as used in Easterbrooks and Hamilton's method(1) is required for experiments carried out which using phenol gave only two-thirds of the theoretical yield of alkyl iodide. Results obtained using samples of disintegrated poly (methyl methacrylate) sheet, moulding granules and poly (ethyl acrylate), were sufficiently satisfactory for a ratio method to be used for the determination of the relative proportions of the two iodides.

Gas Liquid Chromatography

To distinguish between mixed alkyl iodides, gas liquid chromatography was employed. An absorber for retaining the liberated iodides quantitatively was devised. The choice, after several trials, was *n*-heptane at —80°C. A second absorber contained buffered bromine solution.

It was found that if *n*-heptane contained a small amount of methylene chloride as internal standard, loss of methylene chloride resulted with the passage of nitrogen through the absorber even at —80°C. Alkyl iodides were therefore absorbed initially in 0.500 ml. of *n*-heptane. After absorption, 0.500 ml. of *n*-heptane containing internal standard was then added. Methylene dichloride was used for comparison with the larger methyl iodide peak and a smaller amount of ethylidene dichloride for comparison with the small ethyl iodide peak.

Details are given in the paper by Haslam *et al.* of the apparatus and reagents required, the procedure for calibrating the gas-liquid chromatographic apparatus and the general procedure.

It was found necessary to run two chromatograms to find the ratios of (a) and (b). ((a) is peak height of methyl iodide to the peak height 0.005 ml. of methylene dichloride and (b) peak height of ethyl iodide to the peak height of 0.0025 ml. of ethylene dichloride. From these, calibration curves were obtained).

Results for the percentage of poly (ethyl acrylate) in copolymer were 9.04, 9.07 and 9.09 per cent. Results for copolymer known to consist of 97 per cent poly (ethyl acrylate) were 2.96, 3.15 and 3.09 per cent. Experiments in the presence of dibutyl phthalate indicated that this plasticiser did not interfere with the test.

The authors consider that within the limits of the accuracy of the gas-liquid chromatographic method, with close control (generally accepted as being within 2 per cent of the percentage determined) their test was quite satisfactory. Also, as far as they are aware, this is the first time that the determination of alkoxyl groups in polymers has been recorded.

Haslam *et al.* suggest that the principles of this test may prove useful in the general determination of the proportions of mixed alkoxyl groups in monomeric substances. Also, with some modifications, the *n*-heptane trap, which has proved so efficient for absorbing methyl and ethyl iodides, may have other useful applications as, for example, for absorbing substances from the gas stream in gas-liquid chromatography for examination by ultra-violet and infra-red methods.

REFERENCE

(1) Easterbrook, W. C., and Hamilton, J. B., *Analyst*, 1953, **78**, 351.

Nuclear Energy Conference

A Conference on Nuclear Energy is being held by the Federation of British Industries from 10 to 12 April. This conference is the first of its kind in this country. Papers will be presented by experts from the UK Atomic Energy Authority and nuclear power companies, covering various aspects of nuclear energy development. These papers will be non-technical and will be aimed at providing an understanding of the business potentials and industrial applications of nuclear energy.

Soviet Work on Activated Polymerisation Catalysts in Hydrocarbon Media

THE redox or reduction-activation system of vinyl polymerisation is used mainly in aqueous emulsion systems, its most important application being for the manufacture of synthetic rubbers of the so-called 'cold-rubber' type. Up to the present time there has been little use of this principle in hydrocarbon or other organic solvent systems, mainly because of solubility problems.

Recently in the USSR, B. A. Dolgoplosk and co-workers have published a series of papers describing their detailed investigations of such catalyst systems. In one of these papers (Tiniakova, Dolgoplosk and Rabinovich, *Izvest. Akad. Nauk, Otdel. Khim. Nauk*, 1957, No. 6, 702) systems suitable for use in hydrocarbon media are described and the mechanism of the process discussed. These authors used isopropyl-benzene hydroperoxide (IPBH) as initiator and benzoin or diethyl dihydroxy maleate (DDM) as reducing agents, in the presence of a naphthenate of a metal of variable valency, e.g. iron naphthenate. They provide evidence for the hypothesis that the metal acts as an electron carrier in the cyclic process:

$$Fe^{++} \xrightarrow{\text{(i) Peroxide}} Fe^{+++} + \text{radical} \quad (1)$$

$$Fe^{+++} \xrightarrow{\text{(ii) Reducing Agent}} Fe^{++}$$

It is shown that neither the reducing agent nor the metal salt alone has any significant effect on the decomposition of IPBH in the region 20°C to 60°C, in ethyl-benzene solution. Iron naphthenate alone begins to show some effect above 100°C. When both benzoin and iron naphthenate are present together reaction takes place in the lower temperature range, the reaction being of the second order, with an activation energy of 18 Kcal./mol. DDM has a greater effect as it is a stronger reducing agent than benzoin.

Investigation of the kinetics of reduction of ferric naphthenate by benzoin and DDM in toluol or ethyl-benzene solution showed that with benzoin a very slow, second order reaction takes place at 20°C, with an activation energy of 19.7 Kcal./mol. With DDM this reaction is relatively rapid at this temperature, being 70 per cent complete in 10 minutes.

Oxidation of ferrous to ferric naphthenate was shown to be practically instantaneous even at —70°C and the authors interpret these results as providing evidence for the cyclic equation (1). The overall rate of the process is determined by reaction (ii), as is borne out by the small difference between the activation energy for the process $Fe^{+++} \rightarrow Fe^{++}$, and the total activation energy for the interaction of IPBH and benzoin in the presence of the metal salt. These results are in agreement with those found earlier for aqueous systems.

It is surmised that DDM should be a more efficient activator than benzoin for polymerisation and this is borne out by experimental results from the polymerisation of styrene in ethyl-benzene solution at 50°C.

Other metal naphthenates were examined and placed in the following descending order of efficiency: Co, Cu, Pd, Mn, Pb, Ag, Cr, Ni and Fe.

The metal salts alone have some activating effect on the decomposition of IPBH, 1 mol. of Co, Cu or Pd bringing about the decomposition of about 1,000 mols. of the hydroperoxide. This is explained by the cyclic system:

(iii) $M^{+++} + ROOH \rightarrow M^{++} + RO_2 + H^+$ (low rate)

(iv) $M^{++} + ROOH \rightarrow M^{+++} + RO + OH^-$ (very high rate)

The hydroperoxide functions alternately as reducing and oxidising agent.

Both systems (1) monomer + IPBH + reducing agent + metal naphthenate and (2) monomer + IPBH + metal naphthenate are recommended as systems suitable for the activated polymerisation of vinyl monomers in hydrocarbon solution.

PURITY AND PURIFICATION OF CHEMICAL SUBSTANCES

First Humphry Davy Lecture

SOME aspects of the separation and purification of complex substances of large molecular weight such as hormones and enzymes formed the subject of the first Humphry Davy Lecture which was given by Professor Arne Tiselius at the Royal Institute of Chemistry, London, on 19 February. This lecture was sponsored by the London section of the Institute and it is intended to present one at approximately two-yearly intervals. In due course, invitations will be extended to many eminent members of scientific professions.

Professor W. Wardlaw, president of the Royal Institute of Chemistry, took the chair at the meeting. He said that Professor Arne Tiselius was widely known throughout the scientific world, not only as Professor of Biochemistry at Uppsala but for the elegance of his physico-chemical analytical procedures which had been widely adopted. Not only was he vice-president of the Nobel Foundation, but he was a notable president of the International Union of Pure and Applied Chemistry from 1951 to 1955 and had been awarded the Nobel Prize for Chemistry in 1948.

Among the distinguished guests present were Sir Lawrence Bragg, Sir Cyril Hinshelwood, Sir Harry Melville, Sir Alexander Todd, Dr. D. J. H. Hamence (President, Society for Analytical Chemistry), Dr. E. B. Hughes (treasurer, Society of Chemical Industry), together with vice-presidents and several members of the Institute council.

Professor Tiselius's Humphry Davy Lecture was entitled 'Purity and Purification of Chemical Substances.' It will be published as an Institute monograph.

Of necessity, he said, his lecture had to be somewhat restricted in its scope, and it would be confined to some aspects of the separation and purification of complex substances of large molecular weight such as occur in living organisms.

Although the new methods of synthesis of so-called 'isotactic' macromolecular substances (e.g. by Ziegler) had yielded some materials of crystalline character, there were limitations in the extent to which crystallographic properties could be employed. Many recent advances had been dependent on the development and improvement of other separation methods, such as ultracentrifugation, electrophoresis, chromatography, and counter current distribution. The common characteristic among these methods was the appearance of some peak or discontinuity in the diagram which could be used to distinguish chemical individuals in mixtures.

Typical examples of electrophoresis apparatus and resultant diagrams were then shown and the differences between boundary and zone electrophoresis were described in detail. Professor Tiselius said that the boundary method could provide high resolution, but it was zone electrophoresis that made possible complete separation of components. The introduction of zone methods had also enabled electrophoretic methods to be extended to substances of low and intermediate molecular weight. Applications of the newer high-resolution zone technique developed by Smithies in starch gels was referred to and the use of this work with particular reference to the globulins was described. Following this work and that of several others, it had now been possible to establish differences in structure for protein from different species.

Chromatographic methods shared the attractive features of easy characterisation, particularly with the aid of the so-called R values introduced by Martin and Synge, and the technique had recently been extended to large molecules with most useful and interesting results. It had led to the discovery of inhomogeneities and impurities in enzymes and hormones which were earlier believed to be pure, and the method had been employed for the purification of insulin. It was perhaps significant that following the established in 1951 of a committee, charged with the task of recommending some preparations of proteins and enzymes which could be considered as pure and well defined, so far only one protein, this carefully prepared insulin, had been considered satisfactory for adoption.

In the study of the rather fragile substances of biochemistry only 'gentle' methods such as those described could be employed if the substances being studied were to remain in their native condition; the maintenance of this condition during analysis was largely a problem of finding the correct media. There was little doubt, considered the Professor, that a chemical approach to biological structure using some of the methods which had been developed for simple chemical substances would yield valuable information concerning macromolecular substances which was unobtainable by other means. Professor Tiselius concluded that this chemical approach was not only permissible but was of proved value and gave inspiration for new ways of attacking some of the most fundamental problems of today's scientific research.

Boron Hydrides and Potential Uses

UNTIL recently the boron hydrides were important only for their academic and structural interest, remarked Professor H. J. Emeleus, who lectured at a joint meeting held by the London section, RIC, and the Kingston Technical College Chemical Society on 6 February (Dr. C. Simons in the chair). He recalled that although Ramsay reported their existence his experiments were unreliable because he did not realise their sensitivity to air, to moisture and to tap grease. The Professor said that he had worked with Stock, who first identified and characterised the six hydrides of boron, B_2H_6, B_4H_{10}, B_5H_9, B_5H_{11}, B_6H_{10}, $B_{10}H_{14}$. This early work was made difficult because the magnesium boride which was the starting material always contained P and Si as impurities and PH_3 and SiH_4 always seemed to appear in 100 per cent yield. It remained true, however, that these six, and only these six, boranes exist.

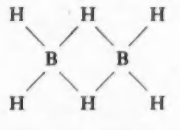
Preparation of diborane in quantity became possible in 1947 when Schlesinger discovered lithium aluminium hydride:

$$4LiH + AlCl_3 \xrightarrow{\text{ether}} LiAlH_4 \xrightarrow{BCl_3} B_2H_6$$

Good yields of diborane may also be obtained from reactions of boron trifluoride.

The boranes pyrolysed to boron and hydrogen, hydrolysed at varying rates, though all reacted with NaOH, and combined vigorously with oxygen. They underwent substitution reactions and the products could contain halogens or alkyls. Not more than four hydrogens in diborane could be substituted, e.g. $B_2H_2R_4$. By reaction with ammonia they could form addition compounds, e.g. $B_2H_62NH_3$, or finally borazole $B_3N_3H_6$ which closely paralleled benzene in physical and some chemical properties. Borazole might prove important as a possible source of inorganic polymers, stated Professor Emeleus.

The structural problem of the boranes had been recently solved. The evidence for



was (1) chemical—only four hydrogens could substitute (2) spectroscopic (3) single crystal X-ray analysis. The structures of the other boranes were similar in that all showed electron-deficient hydrogen bridges.

The borohydrides were discussed and the generality of this type of compound within Group III was stressed; their importance as organic reducing agents was emphasised.

Three technical uses which might become important were mentioned: (1) to produce a thin uniform film of boron on metal, e.g. steel which by heat treatment could develop a hard, corrosion-resistant boride coating (2) $B_{10}H_{14}$ as a possible substitute for sulphur in vulcanising rubber (3) as rocket fuels.

1957 PRICES OF UK PRODUCED AND IMPORTED CHEMICALS

PRICE index number of chemical and allied products for 1957 was 143.2 (June 1949=100), a percentage increase of 2.3 over the 1956 figure (138.8). Figures for the last four years are:

1954	...	130.8	1956	...	138.8
1955	...	133.1	1957	...	143.2

Detailed figures for chemical and allied products are contained in the following tables:

Price index numbers of commodities and groups of commodities produced in the UK

	Annual averages			
	1954	1955	1956	1957
Hard coke	150.4	174.3	194.9	210.9
Dyes and dyestuffs ...	129.1	132.0	140.9	143.1
Disinfectants	110.9	117.1	124.9	126.5
Insecticides, weedkillers & fungicides	123.4	129.0	136.8	131.6
Synthetic resins & plastics materials	121.6	120.9	123.2	121.9
Cellulose acetate moulding powder (opaque)	102.7	90.0	85.9	90.8
Cellulose acetate sheet, commercial clear transparent	121.4	122.0	127.4	127.4
Laminated materials, fabric grade	136.9	137.3	136.9	135.6
Laminated materials, paper grade	131.5	131.3	131.8	130.4
Phenol-formaldehyde moulding powder ...	137.3	136.3	147.7	135.0
Polystyrene thermo-plastic moulding powder	174.9	163.4	160.0	160.0
Polyvinylchloride, Geon polymer 101 ...	116.2	116.2	112.4	110.8
Polyvinyl chloride, Corvic 'HO' ...	112.5	113.7	109.6	108.2
Urea-formaldehyde moulding powder ...	109.6	109.4	109.4	109.4
General chemicals ...	147.3	151.4	156.7	162.1
Acetic acid, BSS 576–1950	134.0	130.0	135.4	149.8
Abrac tri-tolylphosphate tri-cresyl phosphate	114.5	119.3	119.3	119.3
Acetone, BS 509–1950	137.1	127.2	126.9	131.3
Aluminium sulphate (14 per cent Al_2O_3) ...	137.0	146.4	142.2	155.7
Barium carbonate, pre-cipitated 98/99 per cent in powder form	154.5	157.1	162.4	162.4
Barium chloride, fine crystal	120.7	120.7	120.7	135.4
Benzole, pure, BSS 135–1950	179.1	182.9	185.4	196.6
Butanol, BSS 508–1950	110.6	102.6	101.2	104.5
Calcium carbide, BSS 642–1951	110.8	115.6	122.0	125.1
Caustic soda liquor, 100° Tw	145.0	148.2	156.2	162.7
Dichromate of potash	120.8	128.0	133.8	138.7
Hydrogen peroxide, 130 vol.	101.9	103.0	105.4	105.4
Liquid chlorine, pure ...	152.0	152.6	158.4	164.2
Methanol, refined ...	127.2	129.3	135.1	136.8
Nitric acid, concen-trated, 95/96 per cent	136.7	140.7	147.0	147.0
Phenol	156.4	157.1	157.1	157.1
Phosphorus, 99.9 per cent, pure, specific gravity, 1.82, melting point 44.1°C ...	137.0	141.9	148.5	150.9
Phthalic anhydride ...	139.0	146.8	155.8	158.9
Pigments & earth colours, inorganic ...	119.6	126.0	133.0	134.6
Salicylic acid, technical or commercial grade	137.0	135.4	133.0	135.0
Salt	155.3	164.7	173.1	176.8
Soda ash, light (de-livered)	151.3	155.1	163.3	169.1
Soda ash, light, f.o.r. works	157.7	161.9	171.9	179.1
Sodium cyanide, 96/98 per cent standard quality	129.0	129.3	131.8	134.9
Sodium sulphide, solid, 60/62 per cent ...	138.8	141.7	144.8	151.2
Sulphuric acid, BOV ...	154.9	170.6	173.7	176.9
Sulphuric acid, ROV 94/95 per cent ...	171.6	181.1	181.8	186.0
Titanium dioxide, 'Anatase' type ...	132.0	138.6	149.7	162.4
Titanium dioxide, 'Rutile' type ...	129.6	134.8	142.8	151.1
Trichlorethylene, metal degreasing	140.1	143.0	149.3	153.4
Urea, technically pure	134.8	137.1	140.3	141.9
Drugs and pharmaceutical preparations	102.2	102.8	103.9	104.8
Soap, candles and glycerine	112.6	111.9	120.7	126.9
Soap	105.7	106.1	118.5	126.9
Synthetic detergents ...	110.1	106.0	112.3	118.5
Glycerine	230.5	214.7	191.0	164.4

Price index numbers of commodities and groups of commodities wholly or partly imported

	Annual averages			
	1954	1955	1956	1957
Carbon black	136.0	133.6	129.5	133.6
Fertilisers	171.7	182.1	196.7	200.1
Phosphate rock	136.3	147.2	151.9	161.0
Pyrites, c.i.f. UK ports ...	170.5	180.0	178.5	169.7
Rubber, No. 1 RSS, one month future	198.1	329.9	284.2	260.8
Sulphur, crude (for acid making) c.i.f.	159.6	176.6	177.8	172.2

Changes are being made in the price index system. Work is proceding on the calculation of a new series of index numbers based on the 1954 census of production. It is claimed that these indices will give a better guide to current price movements.

For convenience, the remaining series of indices, for which the rebasing calculations have not yet been done will also be related to 1954 by dividing the figures calculated on June 1949 = 100 by the annual average index for 1954.

Annual average wholesale prices for selected commodities produced in the UK

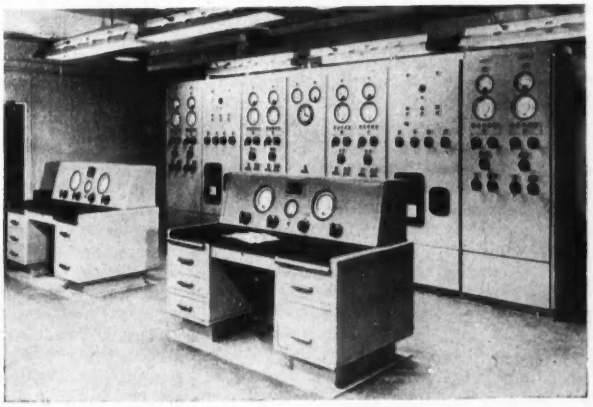
Specification of commodity	Unit of sale	1954	1955	1956	1957
Synthetic resins and plastic materials:					
Cellulose acetate moulding powder (opaque), mini-mum half-ton lot, delivered price	s per lb.	3.35	2.64	2.58	2.75
Phenol-formaldehyde moulding powder carriage paid buyer's address, in 56-lb. non-returnable bags	d per lb.	17.72	17.50	19.00	17.37
Polystyrene thermo plastic moulding powder crystal, carriage paid buyer's address UK	s per lb.	2.83	2.66	2.58	2.58
Urea formaldehyde moulding powder wood meal type, d/d user UK and f.o.b. export	s per lb.	1.29	1.29	1.29	1.29
Other chemicals:					
Calcium carbide, conforms to BSS 642–1951. High grade, 4 tons and over carriage paid	£ per ton	36.20	37.79	39.89	40.89
Pure benzole, BSS 135–1950 bulk minimum lots of 200 gallons delivered user	s per gall.	5.22	5.33	5.41	5.73
Penicillin crystalline 1 mega unit (vial size) ...	s per m.u.	1.55	1.27	1.17	1.17
Petroleum motor spirit average of inner and outer and general zones (3) (4)	s per gall.	3.87	3.79	3.89	4.27
Sulphuric acid ROV 94/95 per cent f.o.r. works, in road and rail tanks for minimum tank loads 5/6 tons	£ per ton	9.57	10.10	10.14	10.37

BT-H Germanium Rectifier Equipment for Chlorine Plant

A GERMANIUM power rectifier rated at 18,000 volts has been installed by British Thomson-Houston Co. Ltd. for Associated Ethyl Co. Ltd., at Ellesmere Port. The rectifiers will supply d.c. power to two electrolytic cell lines for the production of chlorine, and will comprise two equipments each of four units, each unit being complete with its own transformer and associated switch-gear. When the contract was placed, the equipment was the largest of its kind in the world.

The rectifiers are connected in a 3-phase bridge circuit with phase-shift transformers to give 48-phase overall operation. The output of each unit is controlled by means of an auto-connected regulating transformer equipped with 17-position on-load tap-changing gear and a trimming regulator to give fine control between tappings. The induction-type trimmer is excited from a tertiary winding of the regulating transformer and feeds back into a series boost transformer connected between the regulating and rectifier transformer primary winding. The regulating, series booster, and rectifier transformers are combined in one unit. The induction regulators are driven by selsyn receivers controlled from one master selsyn transmitter for each cell line. D.c. current transformers are provided to measure the d.c. output from each unit for metering and constant current control. The summated metering signal is compared with a pre-set reference voltage, and the error signal sent through an electronic amplifier to the amplidyne controlling the master selsyn transmitter. When the induction regulators reach the end of their travel, a transformer tap change is initiated and all four units are re-synchronised to ensure that the correct load sharing is maintained.

The rectifier unit is divided into three cubicles, each cubicle holding six trays of germanium cells which are connected in a series-parallel arrangement.



Main control panel, BT-H 18.4 MW germanium rectifier installation at the Ellesmere Port Works of the Associated Ethyl Co. Ltd.

Analytical Review

NEW CATALYSTS FOR CARBON AND HYDROGEN ANALYSES

By
T. S. West, B.Sc., Ph.D.

In this article Dr. West reviews three papers on elemental organic microanalysis. These are concerned with:

1. New combustion fillings for the C and H determination which permit rapid oxidation at a remarkably low temperature and which also retain sulphur and halogens.

2. A reagent which permits the C and H determination to be carried out in compounds containing the alkali or alkaline earth metals and which avoids the unpleasant features usually associated with such reagents.

3. A recent study of the Dumas method for nitrogen in organic compounds. The method uses purified carbon dioxide from a cylinder and employs the two-tube technique thus permitting rapid routine analyses.

A VARIETY of 'packings' has been devised from time to time for combustion trains used in the determination of carbon and hydrogen in organic compounds. Generally, the packing selected is merely a matter of individual preference and indeed under conditions of rapid oxygen flow and high temperature no packing whatever is necessary in the combustion tube. However, serious consideration should be paid by all microanalysts to the recently published work of Körbl and his associates at the Czechoslovak Academy of Sciences. They have shown that the decomposition product of silver permanganate is a most efficient catalyst for the oxidation of organic compounds and that it is possible to reduce the size of the whole combustion train by an appreciable factor as a result of the relatively short hot zone of catalyst which is necessary(1).

In their most recent paper, the preparation and properties of closely related catalysts containing finely dispersed silver and the oxides of some polyvalent metals such as cobalt, iron, manganese and cerium have been described(2). These preparations were made by precipitating a solution of ferrous, manganous or cerous sulphate with ammoniacal silver nitrate. In the case of the cobalt catalyst, sodium hydroxide was added in place of ammonia.

The silver-containing hydroxide precipitates were heated at 550°C and used in 35-mm. zones in combustion tubes at 550°C with oxygen flow rates of the order of 30 ml./min. in the case of the manganese-silver catalyst. Combustion of 15 mg. samples was complete in 5 to 10 minutes. This remarkably quick process at such a pleasantly low temperature is indeed worthy of earnest consideration. The authors also point out that because of the presence of the finely divided silver these new catalysts automatically absorb chlorine, bromine, iodine and the oxides of sulphur and they quote results which show that the catalysts retain their high efficiency even after they have been poisoned to the extent of 50 per cent of their capacity by sulphur. There can be little doubt but that this paper makes a really significant contribution to elemental organic microanalysis.

Analysis of alkali-containing organic compounds. '*The Microchemical Journal*', a new scientific periodical published by the Metropolitan Microchemical Society of New York, contains some very interesting papers in its first two issues. One of these papers is concerned with the determination of carbon and hydrogen in organic compounds containing alkali and alkaline earth metals(3).

Low results for carbon are, of course, obtained when such compounds are combusted in the normal way because of the formation of thermally stable carbonates. The usual method of overcoming this is to mix the sample with a salt such as potassium dichromate, vanadium pentoxide, potassium persulphate, etc., which effectively prevents carbonate formation. These salts, however, cause inconvenience by spattering over the surface of the combustion tube, subliming, attacking the glass and evolving sulphur dioxide, etc.

Belcher, Fildes and Nutten(4) found that tungstic oxide effectively held back phosphorus when its organic compounds were combusted, and now Kissa(3) has shown that the same reagent is effective in the analysis of compounds containing alkali or alkaline earth metals. In this procedure, the sample is covered with a 6–8 fold excess of desiccator-dry tungstic oxide. The combustion is carried out at 800°C to 900°C, but unfortunately the conditions of oxygen flow, etc., are not specified. Tungstic oxide does not melt during combustion, does not sublime and does not attack the tube or silver gauze which is frequently used to retain halogens and sulphur. The combustion boat (which may be of platinum) is easily cleaned.

It appears that this method has much to offer over the existing methods for the combustion of compounds of the alkali or alkaline earth metals. Indeed, one might almost predict that a dispersion of silver in tungstic oxide might be a very attractive packing (cf. previous paragraphs).

The Dumas Method. Another paper(5) in the first issue of the same journal will also be of interest to microanalysts. This concerns the rapid Dumas determination of nitrogen in organic compounds. The apparatus used is designed and operated in such a way that all causes of gas blank, except air adsorbed in the copper oxide filling, are removed.

The following sources of error were examined: dissociation of carbon dioxide to oxygen and carbon monoxide; oxidation of the reduced copper metal by carbon dioxide with formation of carbon monoxide (above 600° to 650°C); the evolution of oxygen by incorrect usage of hopcalite to remove carbon monoxide and the contamination introduced by rubber connections, stopcock grease and the pressure regulator.

Carbon monoxide was removed by hopcalite at 130°C and oxygen by copper at 500°C to 550°C. Ball and socket joints sealed by Krönig cement were used throughout. The air blank on the 'temporary' filling was found to be constant (0.004 ml.). A mercury nitrometer was used rather than the conventional type where potassium hydroxide comes into contact with the measuring capillary. Cylinder-stored carbon dioxide was used and was found to be readily purified by cooling the cylinder in dry ice overnight, quickly blowing off to the atmosphere, allowing the pressure to rise to 40 p.s.i., blowing off quickly again, etc. (repeating the process about six times) and thus obtaining carbon dioxide at a cylinder pressure of 950 p.s.i. and containing only 0.0002 per cent impurity.

The apparatus adopts the two-tube method of Shellburg(6) with a 'permanent' filling of copper and hopcalite in one tube and a separate detachable tube with standard joints for the copper oxide and sample. By operating a supply of these 'temporary tubes' in conjunction with the one 'permanent' tube, a rapid turnover is obtained in routine analysis. A modified Zimmerman(7) gas reservoir was used immediately behind the hot gases and to buffer the uncontrolled release of gases during combustion. The time required for preheating and removing air was 2.5 to 3 minutes, for burning samples 4 to 5 minutes, for collecting products 2 to 3 minutes and for measuring the nitrogen volume 1 minute. A furnace temperature of 850°C was used for pyrolysis of samples and it was not found necessary to make an intimate mixture of the sample and copper oxide. A high degree of precision and accuracy is claimed for the method in that it was not found possible to achieve a coefficient of variation of only 0.2 per cent by any previous method.

This paper deserves serious study by all microanalysts who are concerned with nitrogen analyses by the Dumas technique. It should be noted, however, that though the precision is very high the paper is somewhat unsatisfactory in that a divergence of 0.15 to 0.2 per cent (absolute) on several analyses is attributed quite arbitrarily to impurities in the sample and not to the method. Both the author and the editors of the journal deserve to be reprimanded for the deplorable practice of referring to *some but not all* co-authors as '*et al*' in the final list of references.

REFERENCES
(1) J. Körbl, *Mikrochim. Acta*, 1956, 1705.
(2) J. Horacek and J. Körbl, *Chemistry and Industry*, 1958, 101.
(3) E. Kissa, *Microchemical Journal*, 1957, 1, 203.
(4) R. Belcher, J. Fildes and A. J. Nutten, *Anal. Chim. Acta*, 1955, 13, 431.
(5) G. M. Gustin, *Microchemical Journal*, 1957, 1, 75.
(6) E. F. Shellburg, *Anal. Chem.*, 1951, 23, 1492.
(7) W. Zimmerman, *Mikrochim. ver. Mikrochim. Acta*, 1943, 31, 42.

GASEOUS EFFLUENTS FROM GRANULATION PLANTS

Work Carried Out at SAI Factory

WORK carried out in Scottish Agricultural Industries on the treatment of granulation plant effluents has resulted in the use of a Venturi scrubber. Since this scrubber was brought into action not a single complaint about the effluent from the plant has been received. This was stated by Mr. F. J. Harris of Scottish Agricultural Industries in a paper read before a meeting of the Fertiliser Society held on Thursday this week at Burlington House, Piccadilly, London W1.

In his paper Mr. Harris reviewed some of the more common methods for treating granulation plant effluents and described methods which seemed likely to afford most promise in the near future. Included in the paper were notes on some of the work carried out in SAI.

Troublesome gaseous effluent from fertiliser granulation plants usually arose from one or more of the following causes: Dust, caused in the main by attrition; fume arising from volatilisation of fertiliser constituents, ammonium chloride being the most troublesome fume; noxious or offensive gases, resulting from either combustion of the fuel used in the furnace or as by-products of the reaction between fertiliser constituents at high temperatures or from thermal decomposition of fertiliser constituents at high temperatures; and liquid droplets arising either as the result of carry over from the wet scrubber or from condensation due to cooling during passage through the ducting stack etc.

In considering legal aspects, Mr. Harris made mention of the Clean Air Act and the Alkali Act.

Stairmand Method

As a first step in finding a solution for the effluent problem, sampling using the method described by Stairmand had been used. With regard to solid constituents, results of tests at SAI's Ayr factory at an input of about 10 tons an hour, showed that approximately half a ton/day of solid matter was being carried past the dry cyclones and the particle size varied between 3 and 20 microns. Only 1.2 cwt./day of dust leaving the cyclones was coarser than 10μ. Composition of the solids escaping was as indicated below.

Composition of solids per cent by weight	
NH_3	14.4
Cl	31.6
SO_3	9.7
K_2O	3.9
P_2O_5	10.5
CaO	8.3
Water insoluble	18.3
Unidentified (balanced figure)	3.3
Total	100.0

Methods of treatment available, either singly or in combination, could be divided into cyclone separators, discharge from high chimneys, filtration, electrostatic filtration, sonic agglomeration and wet scrubber. Four types of cyclones were considered by Mr. Harris in his paper. These were: the medium efficiency high throughput type; the high efficiency (long cone) type; small diameter nested cyclones; and the large diameter irrigated type. Of this last it was stated that when the disadvantage of using a wet system could be tolerated, it was possible to increase the efficiency of a cyclone by using it wet.

Mr. Harris reported that trouble had been experienced with granulation plant effluent even from chimneys 150 ft. and 180 ft. high. Since fume had been noted at ground level 400 to 600 yards from a 95-ft. chimney creating a persistent haze even on fairly calm days with the relative humidity around 70 per cent at the Ayr factory, it was felt that it was better to devise some means of controlling the effluent before it went up the chimney.

Filter Limitation

In considering scrubbing by filtration, the use of fabric filters for fertiliser manufacturers was stated to present a limitation, even wool felt not having proved satisfactory to date. Irrigated filters although not yet well known are believed by Mr. Harris to provide an attractive approach to the solution of granulation plant effluent problems.

Electrostatic precipitation; although it has not been applied to granulation plant effluents to any considerable extent, at least one plant on the Continent was using it. Efforts to develop laboratory-scale tests for the prediction of full-scale precipitators had not yet met with any marked success. Sonic agglomeration was also a method which warranted full consideration.

Wet scrubbers were commonly used to treat granulation plant effluents after cyclones had removed the large dust. Their greatest drawbacks are that recovered fertiliser constituents are frequently in dilute aqueous solution and power costs are high if efficient removal of particles less than 5μ is achieved. Gravitational spray towers with their low efficiency in the particle size range of less than 5μ were unsatisfactory, as it was in the mist and haze associated with gravitational effluents that such small-sized particles existed.

Information on the effectiveness of packed towers was scanty, said Mr. Harris. Cost of equipment for high efficiency use had been said to be of the same order as for a Cottrell precipitator, maintenance costs being less. In this context, a sulphuric acid mist, said to be in size range 0.5-3μ was reported, and collection efficiencies up to 99.9 per cent had been obtained when using low superficial velocities and fine size coke for the packing.

The principle of the high pressure water jet scrubber which had been used by a US company (Dawson Chemical Corporation, Baltimore) to control ammonium chloride fumes from the pug mill of their ammonia granulation process. It was claimed that this type of scrubbing was very effective. However, a main disadvantage was the high cost of power and water for the relatively small amount of gas handled.

A Doyle scrubber has been installed at SAI's new Leith works, where effluent arises from the process producing ammonium phosphate-based fertiliser. These units were reported by Mr. Harris to be 'doing quite a good job.' He stressed that even the most efficient wet scrubber would cause the formation of a steam plume under certain atmospheric conditions.

Venturi Scrubber

Highest collection efficiency of any of the wet impingement type scrubbers was obtained with the Venturi scrubber, with figures near to 100 per cent being quoted for all particles larger than 1½ to 2μ. SAI's own experiences using ammonium chloride and P_2O_5 smokes were in line with the above observations.

In order to study the ability of the Venturi scrubber to handle effluent arising at SAI's Ayr factory, a pilot-plant unit was constructed. A particular feature was the long throat (subject of an ICI, Billingham patent). Following encouraging results from this pilot plant unit, a full-scale scrubber was designed to handle all the gaseous effluent from the dryer at the Ayr plant. The most novel feature of the plant was the length and narrowness of the throat. The height was only 5 ft. 6 in., this feature being of importance if good water coverage was to be ensured. The pilot-plant studies had indicated that this throat gave higher collection efficiency that the conventional short throat. Droplets leaving the sprays were accelerated to approximately the velocity of the gas stream, and the improved performance was believed to be due to the increased period during which the gaseous and water droplets were exposed to the maximum degree of turbulence.

Unusual features of the mist-type cyclones were the serrated skirt (to minimise carry over of particulate waters) and the coned exit which it surrounds.

Because of the extremely erosive and corrosive conditions imposed on the materials of construction, the problems associated with these proved to be most difficult. FMB-type stainless steel had proved most satisfactory for the inlet cone. Rubber-covered mild steel had proved a satisfactory material for the throat and divergent section. Brass and 254 grade stainless steel proved superior for the water manifolds. The exit cones of the cyclones and ducting were now of rubber-covered mild steel.

Much trouble had been given by the exhaust fan unit. Investigation was now being made into the use of multistage rubber-covered fans such as would make

rubber covering of the impellers practicable.

Since the scrubber was brought into action not a single complaint about the effluent had been received, whereas previously they were frequent and serious. Also both the local government officers and the Alkali Inspectorate were well satisfied with the performance, both visual and 'chemical.'

The Venturi scrubber was not suggested as the panacea for all granulation plant effluents, for although it had provided a technical solution at the most troublesome SAI plant, Mr. Harris said they were well aware of its deficiencies from an economic standpoint. Confidence in this choice was nevertheless provided by the manner in which a number of larger US fertiliser manufacturers were now turning to the Venturi scrubber as the most promising method of dealing with their gaseous effluent problem. Several large scale producers of electrothermal phosphoric acid have changed to Venturi scrubbers as a means of overcoming their acid mist discharge.

Rapid Method for Evaluating Rare Earth Samples Developed in US

A SIMPLE and accurate method for using X-ray equipment to analyse rare earth ores, metals and compounds has been developed by US Bureau of Mines. The new technique, it is reported, makes it possible to analyse 40 samples for seven elements each in a single day. By contrast, only about a dozen samples could be analysed in a week by methods formerly used. The development thus promises to speed up the Bureau's research aimed at finding more efficient and economical methods for separating and purifying the individual rare earths.

Basis of the new technique, known as X-ray emission spectroscopy, is that every element has a characteristic, simple X-ray line spectrum. High-energy X-rays directed at a finely ground rare earth sample cause the atoms of the sample to become excited and re-emit fluorescent X-rays, which are characteristic of the elements in the sample. In the Bureau's method, these rays strike a special crystal, which reflects the characteristic line spectra of the various elements at different angles as its face is rotated.

The technique is claimed to provide an accurate method for determining the purity and making quantitative analyses of rare earth preparations. One of its advantages is the ease with which technicians can be trained to prepare samples and operate the X-ray machine.

The method was developed at the Bureau's rare and precious metals experiment station, Reno, Nevada, and is described in a report by Farrel W. Lytle, James I. Botsford, and Henry A. Heller. A copy of the report, R.I. 5378, 'X-ray Emission Spectrographic Analysis of Bastnaesite Rare Earths', can be obtained by writing to the Bureau of Mines, Publications-Distribution Section, 4800 Forbes Street, Pittsburgh 13, Pa.

New Oestrogenic Hormone Isolated from Clover

A NEW oestrogen—a type of hormone regulating specific growth activities—has been isolated from Ladino clover and its structure has been determined by scientists of the United States Department of Agriculture. This potentially valuable oestrogen—named coumoestrol—is also present in lucerne and strawberry clover.

Research workers at the USDA's Western Utilisation Research and Development Division, Albany, California, report that coumoestrol is different in chemical structure from other known animal and plant oestrogens. Although oestrogenic compounds are known to be active in about 40 plants, only a handful of these hormones have been isolated.

Coumoestrol is a crystalline substance about 30 times more active than genistein, one of the most potent oestrogens in forage crops. It is less powerful in its effects on animals than stilboestrol.

Oestrogenic activity interfered dramatically with normal fertility among sheep in Western Australia during the 1940's. Cause of this decline in fertility was at first not understood but was later traced to excess intake of clover oestrogen. This was due to wartime shortages of fertilisers and bulk feeds, and scanty rainfall, causing a greater than normal consumption of clover for a long period of time in that country.

Plant oestrogens are just beginning to be studied systematically. Recent work at Indiana, US, Agricultural Experiment Station, has shown wide variations in oestrogen concentrations in lucerne during the growing season. Work also showed lucerne leaves have more oestrogen than the flowers, and flowers more than the stem. Lucerne silage made with blackstrap molasses contains more oestrogen than lucerne in pasture or lucerne ensiled without the molasses.

Bladder Cancer

Owing to an error in transmission, it was stated in our report on 'Chemical Workers and Bladder Cancer' (CHEMICAL AGE, 8 February, p. 276) that bone cancers occur in workers with 'bituminous' paints. This should have read 'luminous' paints.

Higher Status for Course in Cosmetic Chemistry

THE third year diploma course in cosmetic chemistry at the new Brunel College of Technology at Acton is to be promoted to a position of honour. This was stated by Dr. J. H. Skellon, head of the department of chemistry and biology, at the annual dinner-dance of the Society of Cosmetic Chemists, held at the Café Royal, London and attended by more than 200 members and guests.

Proposing the toast of 'The society,' Dr. Skellon added that the way was now opened to continued progress, with what he hoped would be the endowment of a research fellowship in cosmetic chemistry.

Mr. J. Pickthall, president of the society who presided, responded. The toast of 'Our guests' was proposed by Dr. K. G. Johnson, hon. education officer and was replied to by Mrs. D. L. Wedderburn, lecturer in bacteriology in the society's diploma course.

Australian Monsanto Acquire Two Firms

AN AGREEMENT has been entered into by Monsanto Chemicals (Australia) Ltd. with Drug Houses of Australia, Melbourne, to purchase all outstanding shares of two of that company's subsidiaries.

The two companies being acquired from Drug Houses of Australia are Beetle Elliott Pty. Ltd. and Drug Houses of Australia (Chemicals). Beetle Elliott manufacture plastics materials, principally phenolic urea and melamine moulding powders, as well as polyvinyl acetate emulsions. Drug Houses of Australia (Chemicals) manufacture sulphuric acid, phenothiazine, some inorganic salts and various agricultural chemicals. Both companies operate plants in the Sydney and Melbourne areas.

Principal shareowners of Monsanto Chemicals (Australia) Ltd. are Monsanto Chemicals Ltd., England, and Monsanto Chemical Co. of St. Louis, US.

Education Fund Provides Grants and Bursaries

INCOME of the Plastics Industry Education Fund for the period 1955-57 was approximately £15,000, most of which was subscribed under deeds of covenant by firms in the industry. Over half this sum was spent on providing grants and bursaries for students, together with grants for the purchase of capital equipment at technical colleges.

Among other things the remainder has been used for publishing six monographs on plastics technology for students, on buying library books which are kept at technical colleges, on printing careers literature and on a display case at the Science Museum.

The second progress report of the Plastics Industry Education Fund, for 1955-57, has been published by the Plastics Institute, 6 Mandeville Place, London W1.

Overseas News

JAPANESE TEREPHTHALIC ACID FOR PRODUCTION OF POLYESTER

Japanese companies are to produce a polyester Tetolon. The basic material for this polyester is terephthalic acid which is to be produced from coal. Kawasaki Kasei Co. Ltd. and Teikoku Rayon Co. Ltd., have an agreement with Henkel and Cie G.m.b.h., of Dusseldorf, Germany, for the manufacture under licence of terephthalic acid by the Henkel process (see CHEMICAL AGE, 27 January, p. 190). A royalty of 2.7 per cent from each of the Japanese companies will be paid and also a down payment of DM667,000 (about £67,000) by June this year. Kawasaki Kasei Co. Ltd. will produce 5 tons daily. The capacity of Teikoku Rayon output by October this year will also be 5 tons daily, but by 1961 output is expected to be 25 tons daily.

Having access to petrochemicals, Mitsui Petrochemical Co. Ltd. is to make terephthalic acid from p-xylene according to its own process. Production is to start in October, 1958, with a capacity of 10 tons daily. At a later date output will be increased to 20 tons daily.

With the production of the polyester Tetolon by Teikoku Rayon and of Toyo Rayon also starting in 1958, output will increase from 5 tons daily to 30 tons daily by 1961.

Holland Producing More Salt

According to an announcement by the N.V. Koninklijke Nederlandsche Zoutindustrie, Hengelo, salt production last year totalled 710,000 tons, compared with 626,000 tons in 1956, i.e. an increase of 13 per cent. Production of other chemical products by these works amounted to 120,000 tons, against 108,000 in 1956, or 11 per cent more.

New USSR Process for Zinc Production

The Institute of Chemistry and Technology of Dniepropetrovsk has reported the development of a continuous electrolytic method of zinc production. A continuous ribbon of metal forms which is automatically separated from the cathodes. The rate of extraction of the zinc per unit of cathode surface is claimed to be 12 to 15 times better than that obtained with discontinuous methods; also all manual operation is avoided.

Three installations of this type are in the course of being set up in factories which produce the metal.

New Emulsifier for Vinyl Monomers

Emulsion polymerisation of vinyl monomers and post-stabilisation of synthetic latices is stated to be simplified by the use of an alkyl aryl polyether sulphonate, Triton X-202, developed by Rohm and Haas Co., Philadelphia 5, Pennsylvania, US. Supplied as the sodium salt, Triton X-202 is a slightly viscous paste of fine particle size. Although only slightly soluble in water it may be easily dispersed directly into latex.

It is claimed that latex and emulsion compounds stabilised with Triton X-202 have excellent mechanical stability, even at high pigment and extender ratios. Moderate concentrations of soluble calcium, barium or magnesium salts can be tolerated. Films deposited from latex containing this surface-active agent have shown improved resistance to discoloration on ageing.

Higher Italian Dyestuff Output

According to official Italian statistics, the output of synthetic organic dyes totalled 8,752 tons for the first eight months of last year, as against 6,717 in the same period of 1956.

Nylon-reinforced Phenolics for High Temperatures

According to a report from General Electric's missiles and ordnance systems department nylon-reinforced phenolics withstand ultra high temperatures far better than glass-reinforced phenolics. A new fluid-stabilised arc developed by General Electric is stated to make possible tests at the highest sustained temperatures yet. The results completely revise chemical flame temperature ideas on refractory materials.

S. African Uranium and Thorium Exports

Value of exports of uranium and thorium under the Atomic Energy Act in December last according to a preliminary estimate by the South African Department of Excise and Customs, was £3,856,300, making the total for 1957 £49,859,496. In December 1956, exports of these materials were valued at £4,168,085 and for 1956 as a whole, £38,695,080.

Dutch State Mines' Interest in Chemicals

Nitrogenous fertiliser output by the Netherlands State Mines last year totalled about 900,000 tons, an increase of 25 per cent over the 1956 result. Important improvements have been effected in the nitrogen fixation plant and new equipment for the manufacture of ammonia, nitric acid and urea started operating. It has been possible to utilise this new equipment to its full capacity from the outset. In view of the excellent sales results for urea, output of the plant was doubled.

Production of caprolactam used in the manufacture of nylon, rose by some 40 per cent, and other increases in output, varying between 15 and 30 per cent, were registered in other chemical products such as alcohol and phthalic anhydride. Equipment for the manufacture of caprolactam was enlarged last year to twice its initial capacity.

A plant for the production of high-pressure polythene will be opened by the end of the current year and experiments are being continued in connexion with the manufacture of low-pressure polythene.

Perchlorylation—a New Unit Process by Pennsalt

Pennsalt chemicals have found a new unit process—perchlorylation—which is likened to chlorination, nitration, alkylation and other classical reactions. Basis of the new process is stated to be perchloryl fluoride, developed by Pennsalt in 1952. This is produced on a semi-works plant scale at their factory near Philadelphia. A full-scale unit is to be set up soon.

Research workers at Pennsalt have fully confirmed that the use of perchloryl fluoride results in a new chemical route.

Swedish Starch Firms to Amalgamate

Fifteen factories in W. Blekinge in south Sweden, all producing alcohol and starch from potatoes, are planning to centralise production in one factory, at Ysane.

Rio Tinto's Molybdenite Project

Highly favourable results are reported by the exploration subsidiary of the Rio Tinto Mining Co. of Canada, Rio Canadian Exploration, from its molybdenite prospect in North Western Ontario. There are indications that the area may develop into a massive tonnage proposition. At present, molybdenum is produced by one Canadian company, the Molybdenite Corporation of Canada, which was estimated to produce 900,000 lb. in 1957. Current selling price of molybdenum is about $1.38 per lb.

US Glycol Production

An increase of more than 150 million lb. (14.6 per cent increase) in US ethylene glycol production is noted in a special report issued by the chemical and rubber division of Business and Defence Services Administration of the US Commerce Department. Since 1951, when the output was about 597 million lb., US ethylene glycol production has almost doubled.

The present interest in ethylene glycol in the US is expected to continue. New and enlarged production units are being constructed and additional capacity totalling 320.4 million lb./year is due to be completed after the beginning of this year.

A notable increase occurred in US shipments of ethylene glycol in 1957. Total exports amounted to more than 109 million lb., valued at about $12.6 million in the first nine months of last year, as against 56.8 million lb. in 1956,

valued at over $6 million. Total ethylene glycol exports for 1957 are expected to be about 150 million lb. (164 per cent increase).

Largest consuming industry for ethylene glycol in the US is reported to be anti-freezes. Explosives and Cellophane are the next largest consumers, followed by the plastics industry.

Higher Turnover for AKU but Lower Profits

The general managing director of the Algemene Kunstzijde Unie (AKU) NV, of Arnhem stated recently that 1957 results showed that the value of the group's turnover was higher than ever before; large quantities of some important products were sold but as costs showed a relatively greater increase, the net profit was lower.

Sales of rayon textile yarns were about the same as in 1956 but output was stepped up as a result of technical improvements. The turnover of rayon fibre followed in the main the same trend as in 1956.

Although productive capacity for Terlenka fibre was doubled the firm was unable to supply increased demand and a further increase in the plant's capacity has therefore been taken in hand.

There was a further increase in output and sales of Akulon and also of CMC (carboxymethylcellulose). Output of straw cellulose also showed an increase.

A subsidiary company has taken up the manufacture of cellulose film for which purpose a new plant was opened in August of last year. Good progress is also reported to have been made in the construction of a viscose pilot plant.

Zinc-producing Plant for Sardinia

Assessore all 'Industria in Cagliari have announced that a plant will be built in Sardinia to produce about 15,000 tons of electrolytic zinc a year. The plant, which is expected to cost about 4 milliard lire (£2 million), will also produce from 8,000 to 10,000 tons of sulphuric acid and other by-products.

Latest Beryllium Find

All areas known to contain worthwhile deposits of beryllium in the State have been listed by the South Australian Government. The latest find is reported from the Crocker's Well uranium area, near Olary. There the beryl is in the form of hexagon-shaped crystals which occur in granites and pegmatites.

Antibiotic Additive Promotes Rapid Absorption

Addition of glucosamine to the antibiotic tetracycline has been found from research carried out by Chas. Pfizer Inc., US, to double the level of tetracycline in the bloodstream in the first two hours of therapy. After studying the effect of 84 compounds including several familiar buffering agents and complexes, glucosamine was chosen for the following reasons: complete non-toxicity; no irritating effect on stomach membranes; gastric acidity and secretion are not increased; four calories of energy per gramme only are released; it contains no sodium; it does not give rise to allergy.

Tetracycline plus-additive, known as Cosa-Tetracyn, is the first of a new line of faster-acting antibiotics to be marketed by Chas. Pfizer.

Glucosamine is being produced by the company using a fermentation process at new plant in Brooklyn and in Groton, Connecticut. Patents have been applied for the use of the additive as an absorption enhancer for antibiotics.

B. F. Goodrich Income Falls

Sales of B. F. Goodrich Co., US, and income including associated overseas companies showed a further increase in 1957. Net income, however, was $39,369,705 ($4.40 a share) compared with $43,765,431 ($4.90 a share) in 1956. The fall is attributed mainly to higher wages and freight costs and a 15-day strike in nine plants.

Montecatini Sales and Exports

According to preliminary reports, Montecatini, Italy, sales totalled in 1957 some 294 milliard lire, about 5 per cent more than in 1956.

During the same year the company's exports totalled about 44 milliard lire, some 12 per cent more than in 1956.

Dry Box Aids in Handling Atmosphere-Sensitive Chemicals

An inert-atmosphere chamber ('dry box') has been designed and constructed to handle nonvolatile chemicals sensitive to moisture and/or oxygen used in research on modified inorganic polymers. The assembly is a closed system consisting of a chamber through which dry argon gas circulates from an attached gas purification train and auxiliary equipment. An ante-chamber provides for insertion of reagents and equipment, so that only traces of oxygen and water are permitted to enter.

The system is stated to be satisfactory for processing chemicals sensitive to oxygen and water in laboratory-size synthesis involving rectifications, sublimations, recrystallisations, measurements of indices of refraction and melting points, and accurate weighing of materials. According to the report, no similar dry box is commercially available.

('Inert-atmosphere chamber for chemical operations.' D. L. Herring, US Naval Ordnance Laboratory, Order PB 131067 from OTS, US Department of Commerce, Washington 25, DC, 75 cents.)

Output of Larderello

In 1957, Larderello S.p.A., Italy, produced 14,183 tons of abrasives, borax and ammonia salts and other chemical products, about 27.2 per cent more than in 1956.

Titanium Impeller Withstands Four Years' Corrosive Attack

A turbine impeller made of titanium has been in use for four years agitating a slurry containing cobalt, nickel, copper, arsenic, iron sulphuric acid and iron arsenic compounds at the Colera Mining installation at Garfield, Utah. The reaction is carried out at temperatures of more than 400°F, and at pressures of between 550 lb. and 600 lb. per square inch.

Detailed inspection of the impeller showed that it had been almost unaffected by its four years' exposure.

US Titanium Sponge Producers Worked at Half Capacity by End-1957

SOME segments of the US titanium industry experienced a decline in business while others recorded an increase from 1956, according to the Bureau of Mines, US Department of the Interior.

US ilmenite production is estimated to have increased 4 per cent, achieving a record of 710,000 short tons, while output of titanium pigments, which use most of the ilmenite, decreased 6 per cent. Rutile production was slightly lower than the previous year, totalling about 11,800 short tons. Titanium metal sponge production, on the other hand, was estimated to be 20 per cent higher. Despite this record, most of the producers were operating at less than half of capacity by the end of the year due to a cutback in US defence requirements.

In the period 1 January to 1 November, 1957, deliveries to General Services Administration totalled 8,305 short tons for a cumulative total of 17,594 short tons.

In the nine months' period ending 30 September last the US imported 352,488 short tons of ilmenite concentrates. Imports from India, in particular, were higher than in any year since 1949, totalling 206,797 short tons. Ilmenite concentrates imported from Canada mainly in the form of titanium slag were 143,412 short tons. Imports from Malaya, however, at 2,279 short tons are likely to be considerably below the 1956 figure.

Rutile imports in the first nine months of 1957 were a record at 66,083 short tons (48,906 tons were imported for the whole of 1956). Australia supplied all of this except for 84 tons imported from French West Africa.

Imports of titanium sponge metal for use in the first nine months were 3,266 short tons. This quantity included metal brought in under Commodity Credit Corporation barter agreements. Some 3,152 short tons were obtained from Japan, 67 tons from the UK and 47 tons from Canada.

During the first 10 months of 1957 the US exported 47,166 short tons of titanium dioxide pigments. Canada was the chief customer, receiving 20,370 tons. Countries receiving over 1,000 tons were Australia, Cuba, Colombia, Venezuela, Argentina, the Netherlands, France and Italy.

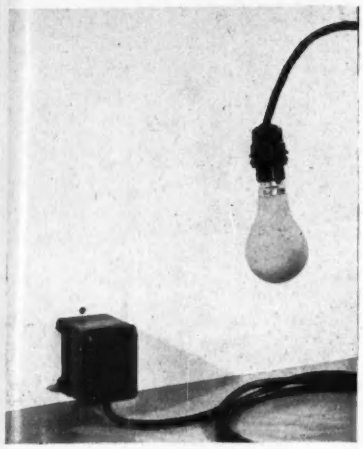
EQUIPMENT REVIEW

Chemical Plant: Laboratory Apparatus

Safety and Anti-Corrosion Products

TRANSFORMER PLUG FOR SAFETY

TRANSFORMER plugs made by the Dohm Group, 167 Victoria Street, London SW1, are intended for safe working with long lead electrical appliances. The plug, cased in hard oil-resisting rubber, is almost as small as an ordinary plug. Like an ordinary plug, it is plugged in to a 3-pin socket, direct to the existing mains supply, and steps down current from 240 volts to 25 volts for safe use with inspection lamps, low voltage soldering irons and machine tools. Price is £3 9s 6d for 25-watt plug or £3 14s 6d for 40-watt plug.



Dohm transformer plug

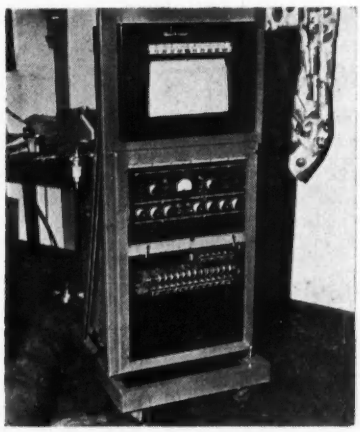
Almost 800 electrical accidents were reported under the Factories Act during 1956, 40 of which were fatal. The Chief Inspector of Factories emphasises in his report that to ensure safety with portable electrical appliances 'the problem is usually best tackled at source, i.e. by reducing the voltage of the supply to the portable apparatus.'

PLASTICS EMULSION POLISH

A MANUFACTURER of industrial floor maintenance equipment, Cimex-Fraser Tuson, 68 Victoria Street, London SW1, have introduced a new type of floor polish, known as HAR2. It is a water emulsion of a newly developed plastics polymer, and the chief feature claimed for it is its non-slip characteristics. Originally developed for the AERE, Harwell, as a protection for the floors and bench tops from minute quantities of radioactive materials, the new polish is now available commercially. It has already been tried out by Government departments, ICI Ltd., Standard Telephone and Cables Ltd., and other large organisations. One application of HAR2 is said to last for six to eight weeks, and a gallon covers 5–8,000 square feet. Price per five-gallon drum is 21s a gallon.

BECKMAN GAS CHROMATOGRAPH

DR. RIGHI, of Beckman Instruments, recently gave a demonstration at Shepperton of process control instruments, including a gas chromatograph. The gas chromatography method of the continuous monitoring of industrial gas systems is a comparatively new one. In it, sample gas is continuously bled from a main process stream and led through the instrument's linear sample valve. Periodically, in response to the instrument's internal timing system, the valve transfers the contents of the sample loop to a constant stream of carrier gas. The sample is flushed through a chromatograph column, which, by means of absorptive or adsorptive granules, such as silica gel, charcoal or aluminium oxide, separates the gas into its component parts, each of which registers its passage through a thermister sensing cell by changing the thermal conductivity of the carrier gas. A second thermister cell, measuring pure carrier gas, serves as the second leg of a Wheatstone bridge circuit. Signals from this are transmitted to a strip chart recorder where they are presented either as a spectrum of the entire mixture or as a bar graph of important components.



Beckman gas chromatograph

The company states that depending on the response in this country it is possible that this instrument will be manufactured here. In the meanwhile the agents for the German firm are Winston Electronics Ltd. of Shepperton, Middlesex, who will also service instruments sold.

COLD-BONDING PHOSPHATING TREATMENT

A COLD-BONDING phosphating treatment, called the SPC process has been introduced by the Walterisation Co. Ltd. of Purley Way, Croydon. The treatment is considered suitable for manufacturers treating sheet metal components, where the size and shape preclude treatment by conventional immersion or spray processes; certain types of laboratory equipment, for example.

The solution, used at the strength supplied, is applied by a spray gun. The same type of gun used for paint spraying is suitable, but working parts should be made of acid-resisting material and the phosphate must be kept in an acid-resisting container. Air pressure of 30 to 40 lb. is recommended.

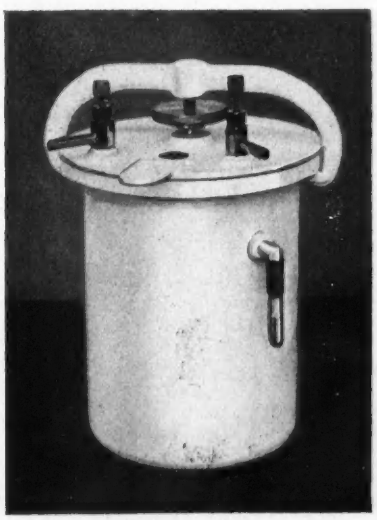
Degreasing is first carried out by wiping with white spirit, trichlorethylene, thinners or other organic solvents. The surplus is wiped off and after five minutes the SPC chemical is sprayed on to the surface to wet the area completely. It is allowed to remain in contact with the steel surface for at least five minutes and is then washed off with clean water. Then the surface is dried by wiping and finally by means of warm air or an oven. The parts are then ready for immediate painting.

The phosphate coating produced will be fine grained with a coating weight of about 60 mg. per square foot, and one gallon of SPC chemical, at 21s 6d, will treat 1,000 square feet of steel surface.

NEW ANAEROBIC JAR

BAIRD AND TATLOCK (London) Ltd., Chadwell Heath, Essex, have introduced a new model anaerobic jar. The room temperature catalyst has been patented and is supplied under licence, it is active at temperatures above 0°C and eliminates the need for electrical or auxiliary heating. The catalyst is contained in a replaceable Monel metal gauze sachet and the life is described as reasonably long.

The jar is provided with a capsule containing a semi-solid indicator. When the jar is ready for use, the capsule is broken and the open end inserted in the



Anaerobic jar

rubber tubing attached to the side arm. Spare capsules are available. Internal size of the jar is 5½ in. diameter by 8 in. deep by 10½ in. overall height, and it is made of copper with dull tin/nickel plating inside. The outside is finished in ivory stoved enamel, with all bright parts tin/nickel plated. It is provided with a side arm for holding an external indicator and a capsule containing a semi-solid indicator is supplied as standard with the jar. The lid is fitted with two needle valves for connection to vacuum and hydrogen supplies.

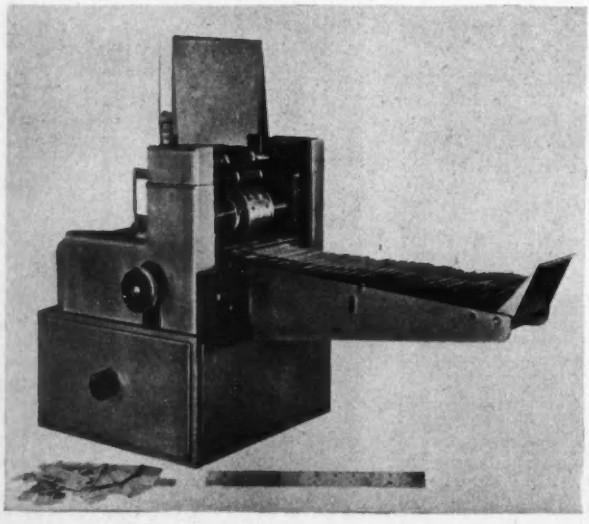
FAST OVERPRINTING MACHINE

REJAFIX LTD., 81–83 Fulham High Street, London SW6, makers of machines for printing on ampoules, vials, collapsible tubes etc. as well as for overprinting machines for labels and collapsible cartons, have responded to the demand by the pharmaceutical industry for a fast overprinting machine for tuck-end cartons.

Known as the Rejafix high-speed carton overprinter model K.2, it has been designed to overprint in one operation details such as code, date, batch, contents, agents and retailers addresses. It is suitable for long or short runs with a high speed performance up to 200 prints a minute. It can be used with either metal or rubber types or plates. Single line metal type holders are provided also to enable operator to make quick changes. Its capacity covers range of cartons from 1¼ in. to 3½ in. collapsed width and from 1¼ in. body length excluding flaps up to 8½ in. overall body length including flaps. Besides collapsible cartons, it can also be used for flat surfaced objects such as suitably rigid cardboard, plastics, metal pieces, etc., minimum thickness .010 in., maximum thickness .065 in.

The machine is portable, size 14 in. × 14 in. × 18 in. high with an automatic self-stacking conveyor belt 18 in. long. It is simple to operate, and can be put in charge of an operator with no previous experience from the start. Changing from one size of carton to another takes under 60 seconds, whilst changing print details takes about the same time.

For feed and take off the operator places the cartons into an adjustable magazine, holding 200 and more cartons at a time. Loading takes place while the machine is running. After passing under the printing cylinder, the cartons are taken away by a continuous conveyor belt and automatically stacked for disposal. Machine is driven by a geared fractional h.p. motor with electrical variable speed control. For use with this machine, Rejafix have formulated special inks for quick-drying and non-offsetting results.



Rejafix high-speed carton overprinter, model K.2

AUTO-RESET TIMER

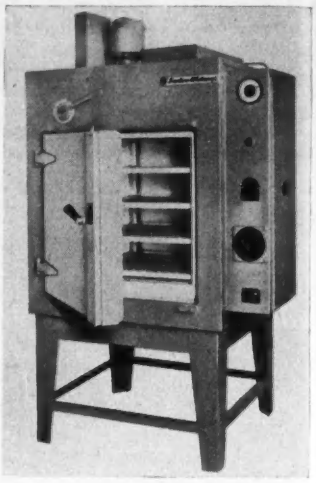
AN auto-reset timer, manufactured by Rodene Electrical Co., Ltd., Spring Grove Works, 579 London Road, Isleworth, Middlesex, is about to go on to the market. Known as the type 7000, it is a new model with a clock-faced flush mounting unit. It can be controlled by a switch or push buttons, and can be connected to reset automatically at the end of the timed period or when a resetting contact is opened.

It can switch one load on or off during timing, and a second load from the end of the timed period until the timer is reset. A pulse output can also be obtained at the end of the timed period which can be used to start a second '7000' timer, and in this way any number of '7000' timers can operate automatically in sequence with, if necessary, the last one re-starting the first one.

Seven time scales are available initially, ranging from 0–15 seconds to 0–3 hours, and others are planned. The weight is 3 lb. maximum consumption 16 VA and the contacts are rated at 3 amps. at 440 volts AC or 5 amps. at 250 volts AC. The diameter is 4½ in. and the overall length 6⅝ in. Price of the instrument is £17.

INDUSTRIAL TRAY-LOADING OVENS

BARLOW-WHITNEY LTD., 2 Dorset Square, London NW1, have introduced a new range of small and medium size standard, general-purpose electrically-heated industrial tray-loading ovens, with alternative types to cover industrial applications such as baking, curing, drying, polymerising and stoving.



Tray-loading oven

There are two basic types in the new standard range designated as Series E.150 and E.300 which cover operating temperatures to 150°C and 300°C respectively. Internal capacities are from 1 to 72 cubic feet, and the majority of sizes are available with natural or fan circulation.

Series E.150 ovens are of all-steel double-skin construction, the cavity walls and doors being fitted with high grade non-sag pads for insulation against heat losses.

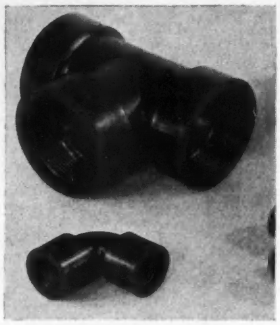
The heating elements are totally enclosed, metal-cased type, conservatively rated for long service and operating at black heat. They are housed in the base or side walls behind anti-radiation shields. Temperature regulation is effected by an adjustable hydraulic thermostat with separate neon indicator, all control gear being housed in the base on small bench-type ovens, except for the door thermometer. On larger sizes the controls are located in a steel case fitted at a convenient working height on the side wall. A motor-driven fan to stimulate air circulation can be fitted.

Series E.300 ovens for temperatures to 300°C are of heavier construction and more heavily insulated for dealing with higher temperatures. Although available with natural ventilation, the types chiefly in demand by industrial users are those fitted with full forced circulation and either horizontal air flow or vertical air flow.

MOULDED POLYTHENE FITTINGS

A RANGE of moulded polythene fittings with deep BSP threaded socket ends is being marketed by Industrial and Marine Protective Applications Ltd., Barnbrook Works, Bury, Lancs. They are designed to fit on to standard pipe threads cut on heavy gauge polythene tube for the handling of corrosive liquids.

The manufacturers advise a seal weld after assembly (although jointing compositions or screw-on back nuts can sometimes be used on very low pressure work) as such a seal weld is positive and because the deep socket holding the pipe is not subject



Pipe fittings in polythene

to weld stresses due to pipe movements. The present range is of tees, 90° elbow bends, flanges with thickened centre boss, couplings, reducers, plugs, caps, nipples and unions in ⅜ in., ½ in., ¾ in., 1 in., 1¼ in., 1½ in. and 2 in. bore sizes. For users not wishing to do their own seal welding the manufacturers can supply made-up flanged sections for on-site installations.

LABORATORY FRACTIONING COLUMN A FREE-STANDING self-contained precision fractionation apparatus for laboratory use is manufactured by Glass Developments Ltd., Sudbourne Road, London SW2. The unit is designed for the separation and analysis of complex petroleum hydrocarbon mixtures and for general use with all volatile organic materials.

A vacuum jacketed column is employed which may be packed with Dixon gauze rings to give about 100 theoretical plates or with any other dumped packing. A vapour divider stillhead operated with an automatic timer is demonstrated but other types of stillheads may be fitted. The reflux condenser and receiver are vacuum jacketed to allow low temperature operation. A manostat-controlled vacuum system which can operate at any set pressure down to 10 mm. Hg. permits substances of high boiling point to be fractionated. The apparatus was originally designed for the research laboratories of British Petroleum Ltd.

BALDWIN REFLECTION DENSITOMETER A VERSION of the Baldwin reflection densitometer has been produced for measuring colour of a wide variety of materials including plastics, rubber and nylon. Makers are Baldwin Instrument Co. Ltd., Brooklands Works, Dartford, Kent.

A four position rotary filter holder is fitted on to the instrument between the shutter and the photocell and the unit is normally supplied with three Ilford tricolour filters. The filters are located in position by means of a positive index and when in position a colour signal on the front of the holder indicates which particular filter is being used. If it is necessary to use more than three filters the rotating disc can be replaced by another holding a different set of filters.

The filter holder is constructed from a heat insulating material which isolates the photocell from the heat of the lamp, preventing the drift which may otherwise occur due to the temperature dependence of the photocell. The holder has been so designed as to allow it to be fitted easily to existing density units.

The reflection densitometer makes use of the Baldwin vacuum cell photometer which is essentially a highly stable d.c. amplifier. The output from this amplifier is fed to a moving coil meter which is calibrated in units of density and illumination A feature of the photometer is a meter which can be fitted having shaped pole pieces which produce an almost logarithmic response. As a result the density scale is almost linear throughout its range, the company state.

KENT MULTELEC RECORDER THE mark 2A electronic Multelec recorder, made by George Kent Ltd., Luton, Bedfordshire, developed for and previously reserved for sale to the atomic energy industries, is now made generally available to all industries.

It can be used for temperature measurement (thermocouple or resistance thermometer), direct millivoltage recording, and for research work. Industrial measurements depending on a radioactive source and ionisation gauge, such as of level, material thickness and density can also be made with the Multelec.

Large numbers of the 2A have been made for Calder Hall 'A' and 'B' and Chapel Cross 'A' and 'B' atomic power stations and for the heavy-water reactors at Harwell, Dounreay, and Sydney, Australia.

Recovery of Benzole Refining Acid

A PROCESS for reclaiming the contaminated acid from benzole refining has been developed by W. C. Holmes and Co. Ltd., PO Box B7, Turnbridge, Huddersfield. The acid produced is claimed to be in a relatively pure form, suitable for many commercial processes. The resinous matter is also brought into a more amenable form, even to the possibility of utilisation.

The recovered acid can be employed in the manufacture of sulphate of ammonia without risk of trouble. The purity of the product is that prescribed by the Grade 1 specification and the appearance is quite normal.

New Dyeing Assistant for Tricel

CARRIER LB, a dyeing assistant for Tricel triacetate fibre, has been developed by Courtaulds Ltd., 16 St. Martin's-le-Grand, London EC1.

Used with the disperse class of dyestuffs, Carrier LB is claimed to extend the range of shades obtainable, to reduce the amount of dyestuff available, and to increase the rate of dyeing.

It is marketed as a self-emulsifying oil containing 25 per cent by weight of active carrier principle. When mixed with water at 60°C with stirring, a finely divided emulsion is formed which is stable for long periods.

Data Handling System for Capenhurst

CONTRACT for a data handling system for the uranium hexafluoride gaseous diffusion plant at Capenhurst has been awarded by the UK Atomic Energy Authority to Sunvic Controls Ltd., 10 Essex Street, London WC2. This will be the largest in Europe it is claimed.

There will be eight units each capable of scanning 260 points measuring process gas, gland and motor bearing temperatures, as well as cooling water temperatures, motor currents and voltage. In a central control room will be equipment for printing a tabulated log showing the value at all measuring points on any one of the 32 cells, the cell identification and the time of scanning. Any point exceeding pre-determined limits will be shown on the log sheet in red. Fitted to each of the eight logger units will be an alarm printer to record the time, identification and value when any point goes 'off-normal' or returns to normal; once again 'off-normal' values will be shown in red, and there will also be a code to show whether a point is high, low or defective.

Additionally, two mobile print-out units will be supplied. These will enable a complete log to be obtained at any time, for any cell, without interrupting normal scanning of the other three cells in the group.

Essential Oils that are Neglected

NEED for close co-operation between perfumer and cosmetic chemist, particularly on points in connection with the nature of the packaging material, and the combination of perfumes and cosmetic material, was stressed by Mr. W. C. Botfield, chief perfumer of W. J. Bush Ltd., at a meeting of the Society of Cosmetic Chemists held on 17 February.

Mr. Botfield, who outlined the art of blending, urged that more general use be made of some of the essential oils which had been rather neglected. Trace amounts of them could be used to great advantage and with the achievement of many subtle effects. The oils in mind were ambrette, angelica, basil, carrot, celery, camomile, costus, cumin, elmi, estragon, ginger, hops, hyssop, juniper, lovage, mace and myrtle.

The essential oils and synthetics reported to give rise to irritation when in creams and in toilet soaps were listed as were those which produced discoloration of the product.

Britain's Position With Eurochemic

Replying to a question in the House of Commons on Tuesday, the Prime Minister said that Eurochemic was an OEEC joint project for the separation of plutonium and the recovery of depleted uranium. The UK already produced sufficient processed fuels and did not therefore participate in Eurochemic. We did, however, provide advice and had indicated our willingness to provide technical assistance and equipment on suitable terms.

Commercial News

Monsanto's 1957 Net Profits Up £159,000, Top Million Mark

RECORD sales and net profits that before tax were up by 10 per cent were announced for 1957 by Sir Miles Thomas, chairman of Monsanto Chemicals Ltd., in a preliminary statement. The value of sales by the parent company was £15,683,272, an increase of 11¼ per cent over 1956, with 41 per cent of total business effected overseas, the same proportion as in 1956. Export sales were valued at £6,416,204 (£5,821,357).

Sir Miles added that 'the demand for our established products is well maintained, both at home and abroad, and the new products that we introduced during the year are meeting with an encouraging response.'

Consolidated group trading profits were £3,093,669 (£2,596,773). After tax of: UK £843,180 (£708,975), Australia £177,367 (£94,597), net profit totalled £1,078,557 (£919,315). Surplus carried forward is £3,475,333 (£3,389,177). Net income after tax is £864,374 (£835,104). A second interim of 8¼ per cent is to be paid, making a 1957 total of 13½ per cent on ordinary capital that was doubled to £5.4 million by a one-for-two rights issue and a subsequent one-for-three scrip issue.

Anchor Chemical

Consolidated trading profit of the Anchor Chemical Co. shows a slight fall, being £122,452, for the year to 30 November last, against £126,405. Net profit of £55,545 compares with £57,512, after tax of £66,907 (£68,893). There is retained in subsidiaries £1,799 (£1,681). The carry-forward is £104,728 (£101,500) after placing £20,000 (£25,000) to general reserve.

A final dividend of 12½ per cent (same) is announced, making a total of 17½ per cent for the year (same).

Power-Gas Corporation

Although the Power-Gas Corporation have had orders of £12.3 million approximated to the previous year's record, the chairman, Mr. W. R. Brown says that there is no room for complacency. Regarding the rise in the group's gross trading profit from £859,714 to £1,052,562 in 1956-57 (see also CHEMICAL AGE, 15 February, p. 331), Mr. Brown points out that some contracts concluded in 1957 had been on hand since 1954 and some on hand now would not reach final accounting until 1960.

Financial restrictions had no effect on the past year, shareholders are informed. But the chairman remarks that it would be 'foolhardy' to ignore clear indications that some schemes in which the group might reasonably hope to participate as contractors are likely to be postponed until restrictive measures are eased. To meet such steps, Power-Gas are taking steps to fill any temporary gaps that may occur.

The chairman's statement notes that the gas industry is becoming increasingly interested in the gasification of oil; and the gas plant division is chiefly occupied with the construction of Segas plants. Several contracts, including some on the Continent, have been booked for this type of plant. The company's Far East licensee has obtained orders for carburetted water gas plant and gas producers. Changes in gas-making techniques have involved considerable research expenditure by Power-Gas.

The chemical plant division is reported as having had a useful variety of orders from home and abroad.

Of the associated companies, it is stated that Rose, Downs and Thompson Ltd., have an improved oil impeller which has met with encouraging success and a process for sheet metal cladding cylindrical bodies. Ashmore Benson, Pease and Co. Africa (Pty.) Ltd., have had considerable success in securing further orders, the more important being a glycerine plant and a hydrochloric acid plant.

Power-Gas France SARL is striving to become established and might prove a most valuable asset if unrestricted trading with the Continent were to occur. Operations generally so far as Power-Gas Canada Ltd. have been concerned have been curtailed.

Anglo-French Phosphate

Net profit for 1957 of the Anglo-French Phosphate Co. was £48,638 (£45,793) after charging taxation £68,350 (£60,300). The sum of £15,000 (£20,000) has been placed to general reserve.

A net dividend of 30 per cent, as against 30 per cent, is being paid for 1957.

British Industrial Plastics

Satisfactory sales and profits are reported by British Industrial Plastics for the year to 30 September last. These were at a higher level than in the previous year. Export sales have also shown a steady expansion, states the chairman, Mr. E. R. Crammond.

Group turnover increased by 9 per cent to a record figure of over £6.5 million and the same 10.3 per cent profit percentage to turnover was retained as in the previous year. Group profits before tax were £667,440, against £616,346, and the net balance £296,073 (£296,495). During the year £415,000 was spent on plant and property additions in contrast to an average annual expenditure of £260,000 over the previous eight years. At the year-end on 30 September last outstanding capital commitments were £234,000 as against £164,000 outstanding a year earlier. In spite of this large outlay, group bank balances were reduced by only £32,000 to £282,282. The chairman says in his report that it is not intended to raise additional finance before it can be profitably employed.

The dividend has been maintained at 20 per cent.

Current year trading is reported as satisfactory with the first quarter's sales and profits running at a higher level and the order book is described as sound.

British Oxygen Co.

Group profits of the British Oxygen Co. Ltd. before depreciation and tax increased by nearly £1.37 million (17.5 per cent) to £9,181,548 for the year to 30 September 1957. The preliminary statement issued by the company states that sales volumes of most of the group products again increased at home and overseas. This growth in sales has held to counteract the continued heavy increase in operating expenses at all stages, it is reported.

After substantially heavier depreciation (£3,217,463 as against £2,610,299) and tax charges (£3,215,099 compared with £2,699,611), the profit balance is up from £2,498,853 to £2,748,986. The profit attributable to British Oxygen Ltd. is also up, from £2,260,906 to £2,440,245.

The ordinary dividend is held at 10 per cent with an unchanged 6 per cent final dividend.

Laporte Industries Ltd

The result of the offer by Laporte Industries Ltd. to ordinary stockholders of 3,245,897 ordinary shares of 5s at 10s 6d per share is that acceptances totalled over 98 per cent of shares offered. Applications were received from about 50 per cent of the ordinary stockholders for a total of nearly 2,000,000 additional shares. Therefore, applications for up to 17 shares have been allotted in full and those for more than 17 shares have been allotted 17 shares each.

Universal Asbestos

A fall in group profits is recorded for Universal Asbestos Manufacturing Co. for the year ended 29 September last. After all charges except tax, the profit contracted from £340,135 to £201,358, and the net balance from £164,073 to £84,309.

Turnover was somewhat above that of the previous year but profit margins were reduced. As a result of a price increase which became effective in August last, however, profit margins are now more satisfactory. A second interim dividend of 10 per cent has been declared. No final dividend will be recommended and the total for year to 29 September last is 17½ per cent, against the equivalent of 16 per cent.

Milton Antiseptic

Trading profit of Milton Antiseptic Ltd. of £159,027 for the year to 30 September 1957 shows an increase of £16,237 over the previous year's profit. Net profit of the group was £58,390 and of the parent company £52,177 as compared with £46,477 in 1955–56. These results according to the chairman, Mr. E. J. Tucker, reflect credit on the operation of the company's factories, control of expenditure and on the

sales organisation. Also, despite further increases in costs over the year, retail prices of Milton products have remained unchanged.

Sales of the company's fine chemicals in overseas markets are reported to be beginning to expand in a very satisfactory way. The advance in sales by Milton Chemicals Export Ltd. has been maintained and the basis has been broadened by selling a wider range of products.

Distribution of a higher proportion of the year's net profit has been recommended by the board and a dividend of 18 per cent is declared on ordinary shares.

Turnover and profits for the first four months of the current year are stated to have been satisfactorily maintained.

NEW COMPANIES

FARM CHEMICALS LTD. Cap. £1,000. Manufacturers of and dealers in chemical and other manures, manurial products, fertilisers, etc. Directors: G. H. N. Chamberlain, T. R. B. Chamberlain, P. T. Pettit, A. K. Pettit. Reg. office: The Lymes, Friars Street, Sudbury, Suffolk.

FISH-MANURES AND FERTILIZERS LTD. Cap. £25,000. Manufacturers of and dealers in fish manures and fertilisers, phosphate of lime, phosphate rock, etc.

INCREASE OF CAPITAL

FERRAMIC INDUSTRIES LTD. Manufacturers of chemical and other preparations, cements, oils, paints, etc., 25 Hydeway, Welwyn Garden City, Herts. Increased by £70,000, in £1 shares, beyond the registered capital of £60,000.

BERTRAM GRIFFITHS DRUG AND CHEMICAL COMPANY LTD., 195/7 Richmond Road, Cardiff. Increased by £12,500 beyond the registered capital of £5,000.

Chemical Stocks and Shares

EXPANSION AHEAD FOR BORAX

A COMBINATION of unfavourable factors has spread a feeling of depression throughout stock markets. Industrial equities, together with chemical shares, momentarily weakened on the news of the Sudan border dispute. Also, in spite of President Eisenhower's attempt to minimise the effect of the US recession, the general business outlook there is still viewed with caution.

Boots Pure Drug were active on their property revaluation and, after having been 21s 3d, a rise of 2s, reacted to 20s 6d. ICI eased from 36s 10½d and Laporte new rights were steady around 4s premium.

The forecast made last October by Monsanto Chemicals is now upheld in the preliminary report of the full year's figures, which show the remarkable expansion of 19 per cent in the group's gross trading profits and just over 16 per cent in profits before tax. No turnover figures for the group are given, but the results indicated by the net profits figure, which before tax increased by 10 per cent, that profit margins may have been just maintained.

This latest statement suggests confidence in the company's activities; demand for established products is stated to be 'well-maintained' and new products are meeting with an encouraging response. Exports have been held at 41 per cent of total business, and it seems that the increase in export sales may have been concentrated in the first half of last year.

With the £2 million rights issue in March last and the subsequent one-for-three scrip issue of £3 million in October, ordinary capital of the company has been doubled, and on this capital equity earnings are now 30.3 per cent to cover the forecast 13½ per cent dividend. It is unlikely that the new capital has yet started to contribute to earnings.

Borax (Holdings), having recently published their annual statement and accounts, have disappointed market expectations but from the confident tone Mr. Desmond Abel Smith has taken, shareholders can look forward with every possible hope for the future. He states 'Your board and your managements continue to feel that the long-range outlook for your group's business is good and that continued growth over the years is to be anticipated.'

In May, 1956, the company was reorganised and consequently it has been made very difficult to compare the latest figures with those for the previous period. The past year, for instance, saw a full period of operating of the new trading subsidiaries which came into being when the reorganisation was made effective. The principal at this time was the merging of United States Potash with United States Borax and Chemical Corporation.

Because of the difficulty in comparing the previous figures there is little to be gained in detailed comment on the balance sheet. Without exception, the financial position remains impressively strong, with gilt-edged amounting to £1.98 million against £1.45 million, and other cash items bringing the total of quick resources to over £4 million, out of a current assets total of £10.68 million. Bearing in mind the sharp contraction in outstanding capital commitments to £585,000—they were £7.25 million a year earlier—and the benefits which should be still to come from recent expansion, the prospect on the dividend front is brighter than it might otherwise have been.

The 5s deferred shares at 16s 11½d, with a dividend of 8¾ per cent, yield 2.8 per cent.

1957/1958 High	1957/1958 Low		25 Feb.	Change on last two weeks
23/7½	16/4½	Albright & W. 5/-	16/9	—6d
11/6	10/6	Anchor 5/-	10/9	—3d
1/3	1/-	Ashe 1/-	1/1½	—
24/6	19/9	Bakelite 10/-	19/9	+1½d
7/10½	4/9	Berk, F. W. 5/-	4/9	+1½d
36/-	16/-	Borax 5/- Dfd.	16/1½	—7½d
10/9	8/10½	Bt. Chrome 5/-	9/9	—3d
13/10½	10/3	Bt. Glues 4/-	10/7½	—1½d
6/4½	4/9	BIP 2/-	5/-	—1½d
8/6	5/6	Bt. Tar 2/6	8/-	—2½d
35/-	27/3	Bt. Xylonite	28/3	—9d
4/4½	3/6	Coalite 2/-	3/7½	+1½d
60/3	45/9	Fisons	47/6	—9d
9/6	7/9	Hardman & H. 5/-	7/9	—
34/6	24/1½	Hickson & W. 10/-	32/-	—
46/6	36/1½	ICI	36/10½	—6d
4/9	2/6	Kleemann 1/-	3/1½	—1½d
14/9	14/-	Laporte 5/-	14/-	—6d
22/-	13/9	Lawes 10/-	14/-	—
19/3	12/4½	Monsanto 5/-	13/-	—4½d
15/6	11/-	Reichhold 5/-	11/1½	—1½d
11/9	8/10½	Yorkshire Dye 5/-	8/10½	—1½d

Chemical Age Back Numbers Required

A COMPLETE set of CHEMICAL AGE going back to 1919 is required by a reader in Germany. We cannot supply this from stock and if anyone has such a complete set which he has no further use for, would he please write to Mr. H. A. Willmott, Manager, CHEMICAL AGE, 154 Fleet Street, London EC4.

Market Reports

'Moderate' Activity in Industrial Chemicals

LONDON In the market for industrial chemicals new home demand has been moderately active whilst contract delivery specifications are keeping well up to schedule. The call for shipment is well maintained and covers most sections of the market. There has been a good request for hydrogen peroxide and formaldehyde with chlorate of soda and the general run of the soda products meeting with a steady demand. The call for fertilisers continues to expand, and supplies of basic slag. Prices show little change on the week.

Quotations for red lead, white lead and litharge were increased by 45s per ton as from 19 February, and the new rates were given in the list of prices recorded in last week's issue. Among the coal-tar products there has been an active demand for pitch on home and export account whilst there is a steady enquiry for crude and refined tar.

MANCHESTER Although there has been a slight contraction in one or two directions a steady flow of delivery specifications against contracts has been reported on the Manchester chemical market during the past week, these relating to a wide range of soda and other compounds for the textile and other main industrial outlets. The demand on overseas account keeps up satisfactorily. A fair sprinkling of fresh enquiries covering both branches of trade has been dealt with. The price position generally remains on a firm basis, The movement of fertilisers continues to show signs of seasonal expansion, and a steady call for most of the tar products is reported.

GLASGOW Conditions generally during the past week in the Scottish heavy chemical market had a tendency to be rather quieter and business was mostly for nominal quantities against current demands. Towards the end of the week, however, a little improvement was noted; some interest was shown in the form of enquiries received in connection with forward requirements. On the whole, prices showed little or no change, and remained fairly firm.

PEOPLE in the news

● DR. JAMES CRAIK, chairman of Nobel division of ICI Ltd., was one of 60 members of the staff to receive long service awards in Glasgow on 21 February. DR. JAMES TAYLOR, director of ICI Ltd., presented the awards to members of the headquarters staff, of whom eight had 40 years service. Dr. Craik received his award in the 30 years' group.

● The Textile Institute has awarded a fellowship to DR. L. R. ELLIOTT, head of the Bradford Institute of Technology, chemistry and dyeing department.

● MR. WILLIAM C. WEST, Junr., aged 38, has been elected president of the West Instrument Corporation, Chicago, US, in succession to his brother, Commander RICHARD K. WEST who disappeared while on a flight in his company's aeroplane over Lake Erie on 13 December 1957. Commander West was chairman of the UK subsidiary, West Instrument Ltd., Brighton.

● MAJOR EDWARD YONGE will retire from the board of Burt, Boulton and Haywood Ltd., Brettenham House, Lancaster Place, London WC2, on 31 March.

● The resignation of MR. W. C. ARCHIBALD as a director of Compania Salitrera Anglo-Lautaro (Anglo-Lautaro Nitrate Corporation) is announced.

● MR. RALPH E. HUFFAM has been appointed a director of Griffiths Hughes Proprietaries and of E. Griffiths Hughes, the operating company.

● Members of the newly formed advisory council on middle east trade include: MR. J. K. VAUGHAN-MORGAN, M.P., Minister of State, Board of Trade, formerly a director of the Morgan Crucible Co.; MR. W. R. BESWICK, director, Power-Gas Corporation Ltd. and Ashmore, Benson, Pease and Co. and a past chairman of the British Chemical Plant Manufacturers Association; THE HON. M. R. BRIDGEMAN, C.B.E., deputy chairman, British Petroleum Co. Ltd.; and MR. GEOFFREY C. R. ELEY, C.B.E., chairman of the Brush Group Ltd., and British Drug Houses Ltd., and a member of the board of James A. Jobling and Co. Ltd.

Mr. Glanvill Benn, chairman of the Benn Group of companies, who are publishers of trade journals and books, including 'Chemical Age,' is shown here leaving London Airport on 23 February on a business trip which will take him round the world. He is visiting Irak, Pakistan, India, Singapore, Hong Kong, Japan, Honolulu, British Columbia, Eastern Canada, Boston and New York, and will be away until Easter. Mr. Benn flew in an *Elizabethan* of British European Airways

● MR. W. H. COATES has been appointed to the board of British Chrome and Chemicals.

● MR. W. TUSON has been appointed a director of Petrochemicals Ltd. following the resignation of MR. E. J. BARNSLEY. Mr. Tuson was chief accountant of Petrochemicals until 1955, when he transferred to Shell Chemical Co.

● MR. PAUL ALLAN TEMPEST, of Keighley, and MISS MAUREEN PICKARD, of Bierley, both of whom are laboratory assistants at the works of Sandoz Products Ltd., Bradford, were married on 22 February.

● MR. GORDON GRANT, C.B., an under-secretary of the Board of Trade, has been appointed comptroller-general of patents, designs and trade marks with effect from 3 March.

● LIEUT.-COLONEL S. J. M. AULD has joined the board of directors of Industries Group Sales Ltd.

● BX Plastics, a subsidiary of British Xylonite announce the appointment of MR. P. S. ADAMSON to the board of directors.

● MR. C. H. M. BAKER has been appointed to the board of directors of Firestone Tyre and Rubber Co. Ltd., Brentford. Mr. Baker, who has held the position of chief purchasing agent since 1947, joined the company in 1928 and first worked in the head office sales division at Brentford. In 1935 he became advertising manager. From 1940 to 1945 he was connected with the production side of the Brentford operation.

● MR. D. A. HUBBARD has been appointed a director of Aero Research Ltd. He joined Aero Research in 1939 and shortly afterwards took charge of production. In 1947 he was appointed works manager with special responsibility for the planning and commissioning of the large scale production plants which have been erected at Duxford since that time.

● Chairmen of ABCM area productivity committees for 1958 have been elected for Bristol, London and Scotland. Thus DR. N. B. DYSON, Monsanto Chemicals Ltd., succeeds MR. A. D. SELWOOD, Transport and General Workers' Union, at Bristol. MR. A. J. GAIT, Shell Chemical Co. Ltd., takes over the London section chairmanship from DR. E. F. BROOKMAN, plastics division, Imperial Chemical Industries Ltd., and COL. F. M. POTTER, Scottish Tar Distillers Ltd., has been reappointed chairman of the Scottish area committee.

● MR. N. M. PEECH has been appointed a director of Albright and Wilson Ltd.

He is chairman and managing director of Steetley Co. Ltd., and has been a treasury nominee on the board of Albright and Wilsons' subsidiary Solway Chemicals Ltd. since 1952.

● MR. GEORGE WEST, assistant export manager of the chemicals division of Newton Chambers and Co. Ltd., Thorncliffe, near Sheffield, has just returned from a 25,000-mile business tour of Commonwealth countries and the Far East. He visited agents in countries where Izal products are already extensively used, and investigated conditions and prospects in other areas where important and rapid developments are taking place. Mr. West is the son of SIR HAROLD WEST, former managing director of Newton Chambers.

● Return of PROFESSOR ALEXANDER S. CARSON to Leeds University after six months' teaching in physical chemistry at Buffalo University, US, coincides with the granting of leave of absence to three other Leeds professors to enable them to accept invitations to lecture in the US. PROFESSOR F. S. DAINTON, professor of physical chemistry and chairman of the School of Chemistry, has been invited to be visiting professor at the Massachusetts Institute of Technology for three months from February, 1959, PROFESSOR G. H. LATHE, professor of chemical pathology, has been invited to give the opening address at the conference on the physiology of prematurity at Princetown, New Jersey, in March. PROFESSOR A. L. ROBERTS, Livesey professor of coal, gas and fuel

industries and chairman of the Houldsworth School of Applied Science, has been asked to contribute to a conference on high temperature chemistry and physics arranged by the Massachusetts Institute of Technology in June, and to the Gordon research conference on solid state studies in ceramics in July at Meridan, New Hampshire.

● DR. E. S. PAICE has been made deputy manager of the new Royal Dutch/Shell plastics laboratories in Delft. He was manager of the plastics and resins department of the Shell Chemical Co.

Other Shell Chemical appointments include that of MR. R. E. MCONIE, manager of general chemicals department, as manager of plastics and resins department, London, MR. J. E. GARNER, chemical sales manager of the Midlands sales division, as manager of general chemicals department, MR. R. A. TAYLOR, detergents sales manager of the Midland sales division, as manager of the Scottish sales division, Glasgow, and MR. D. MEADOWS-JONES, representative of the Midland sales division, as chemical sales manager of the division.

MR. H. E. B. JONES, representative of the Midland sales division, is to be detergent sales manager of the division, MR. K. E. C. EMSDEN, assistant to the chemical sales manager, Nothern sales division, has been appointed plastics sales manager of the division and MR. J. A. MINCH, who has been specialising in the sale of 'Epikote' resins, has been appointed plastics sales manager of the London sales division.

Plastics Pioneer Celebrates 100th Birthday

SIR JAMES SWINBURNE, F.R.S., regarded by many as the founder of the modern British plastics industry, celebrated his 100th birthday on 28 February. Sir James, who until 1953 was chairman of Bakelite Ltd. and is now honorary president of the company, was trained as an engineer and made many important contributions to electrical engineering, for which he was elected a Fellow of the Royal Society in 1906.

Sir James Swinburne

It was seeing a piece of synthetic resin made by the Austrian chemist, Luft, that aroused his interest in plastics. In 1904 he established a laboratory in London, and after two years' research found that he could produce phenol formaldehyde resin, using sodium hydroxide as a catalyst. He delayed registering his patent in the hope of discovering a better process. When he eventually went to the Patent Office he found that he had been forestalled by one day by Dr. L. H. Baekeland.

Shortly afterwards Sir James produced a lacquer called Damard, and in 1910 the Damard Lacquer was set up in Birmingham. During the 1914-18 war Damard concluded an agreement with Dr. Baekeland to use his patents in the UK. After the war Damard combined with Mouldensite Ltd. and Redmanol Ltd. to form Bakelite Ltd.

Research Institutes and Rating Anomalies

THE RATING of scientific societies and some anomalies in the rating of industrial research were examined by a subcommittee of the Parliamentary and Scientific Committee during 1957, according to the annual report of the committee which has just been published.

On 12 February a meeting was held with Mr. Henry Brooke, Minister of Housing and Local Government, and his Parliamentary Secretary, Mr. J. R. Bevins. Nothing could be done, said the Minister, until the appropriate legislation was nearer reaching the House.

Additional information was obtained and on 16 July Mr. Brooke received a deputation from the committee. He said he would like further evidence to substantiate the point that the present operation of the Scientific Societies Act was 'somewhat haphazard'. He was also prepared to consider further evidence as to anomalies with regard to the rating of industrial research.

A further memorandum was presented to the Minister drawing his attention to a number of anomalies in the rating of scientific institutions and research associations. During the second reading of the Local Government Bill on 9 and 10 December the Minister announced that he intended to set up a committee to give special consideration to the rating of charities.

British Oxygen Awarded Dounreay Contract

THE UK Atomic Energy Authority has awarded a contract to British Oxygen Engineering Ltd. for the installation of a special plant at Dounreay which will remove all traces of air from argon and return the gas to its original state of high purity.

Basically, the process consists of injecting hydrogen into the impure gas to remove oxygen in the form of water, followed by low temperature distillation for nitrogen removal.

Refrigeration for the process is provided by the use of liquid oxygen, and the contract awarded to British Oxygen Engineering includes the provision of two small liquid oxygen plants and a liquid oxygen storage vessel.

Use of argon to provide an inert atmosphere plays an essential part in the Dounreay project. The gas employed must reach exceptional standards of purity since even the smallest contamination by air will render it useless.

KID List Extended

A supplementary list (Key Industry List J) of synthetic organic chemicals, etc., which are liable to Key Industry Duty under the Safeguarding of Industries Act, 1921, has been introduced by a Board of Trade order. The Order, which comes into operation on 1 March 1958 is SI No. 292 and can be obtained from HMSO and branches price 3d, by post 5d.

Obituary

MR. JAMES FORSTER, managing director of the Felling Zinc Oxide Co. Ltd., Felling-on-Tyne, has died at the age of 61. He joined the firm 36 years ago as a cashier.

MR. JULIAN LEVETT BAKER has died at Maidenhead, aged 84. Mr. Baker was well known in the chemical and brewing industries, being examiner on brewing for the City and Guilds of London Institute from 1908 to 1911 and examiner on brewing and malting for Birmingham University from 1928 to 1931. From 1907 to 1920 he was editor of the *Analyst* and from 1920 to 1949 of the *Journal* of the Institute of Brewing.

MR. ALFRED THOMAS WARD, of British Thomson-Houston Co. died on 14 February at the age of 61. He joined the company in 1923 as foreman of the oil and varnish department and he transferred to the research laboratory (insulation engineers section) in 1925. He was concerned with the development of synthetic resins and moulding powders and he had built up a close association with many manufacturers of mouldings throughout the country.

"VULCAN" BRAND IRON AND STEEL CARBOY HAMPERS
SAFETY CRATES, PACKED CARBOYS
HARRIS (LOSTOCK GRALAM) LTD.
LOSTOCK GRALAM, NORTHWICH, CHESHIRE.

NEW PATENTS

By permission of the Controller, HM Stationery Office, the following extracts are reproduced from the 'Official Journal (Patents)', which is available from the Patent Office (Sale Branch), 25 Southampton Buildings, Chancery Lane, London WC2, price 3s. 3d. including postage; annual subscription £8.

Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period.

AMENDED SPECIFICATIONS

Copies will be on sale 26 March or as soon as possible thereafter

Preparing 3-(4¹-chlorobenzhydryloxyl)-tropane. Schenley Laboratories, Inc. **773 290**

ACCEPTANCES

Open to public inspection 2 April

Catalytic desulphurisation of petroleum hydrocarbons. British Petroleum Co., Ltd., Northcott, R. P., and Housam, E. C. **792 573**

Organopolysiloxane compositions for rendering cellulosic materials non-adherent. General Electric Co. **792 845**

Organic compounds containing nitrogen and phosphorus and their manufacture. Ciba Ltd. **792 595**

Separating aromatic secondary amines from mixtures of aromatic primary and secondary amines. Leda Chemicals, Ltd., and Jolles, Z. E. **792 830**

Screw presses for expressing liquids from liquid-bearing materials. Rose, Downs & Thompson, Ltd. **792 870**

Process and apparatus for electrodialysing liquids. Ionics, Inc. **792 623**

Cyclopentanophenanthrene compounds. British Drug Houses, Ltd. [Cognate application 16379.] **792 727**

Catalytic dehydrochlorination of (chloroethyl) benzyl chloride. Dow Chemical Co. **792 859**

Process for the treatment of textile fibre. Deutsche Gold- Und Silber-Scheideanstalt Vorm. Roessler. **792 624**

Alkylation process. Esso Research & Engineering Co. **792 642**

Phenolic resins and their use in moulding processes. Monsanto Chemicals, Ltd. **792 574**

Production of nitriles. Union Carbide Corp. **792 575**

Plastics compositions. Imperial Chemical Industries, Ltd. **792 695**

Linear polymers and copolymers containing methylol ether groups. Farbenfabriken Bayer AG. **792 874**

Complex grease containing hydrogenated castor oil. Esso Research & Engineering Co. **792 767**

Synthetic ester lubricants. Esso Research & Engineering Co. **792 768**

Copolymers. Esso Research & Engineering Co. **792 750**

Continuous method for reducing oxidic zinc ores indirectly by means of carbon. Warland, E. **792 846**

Polymerisation of organic compounds. Deutsche Gold- Und Silber-Scheideanstalt Vorm. Roessler. **792 812**

N-acyl derivatives of glutamine and asparagine and compositions containing them. Merck & Co., Inc. **792 576**

Process and apparatus for the manufacture of propellant powder. Olin Mathieson Chemical Corp. **792 848**

Method of incorporating water soluble salts in propellant powder grains. Olin Mathieson Chemical Corp. **792 820**

Pre-annealing treatment of titanium metal. Imperial Chemical Industries, Ltd., and Adams, G. J. **792 731**

Processes for preparing aviation fuels and liquid hydrocarbon mixtures suitable as aviation fuel components. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. **792 643**

Elastomers. Imperial Chemical Industries, Ltd. **792 580**

Catalytic dehydrogenation of secondary alcohols to ketones. Esso Research & Engineering Co. **792 644**

N-sulphanilyl ureas and process of manufacturing same. Boehringer & Soehne Ges., C. F. **792 776**

Preparation of catalyst particles. Esso Research & Engineering Co. **792 645**

Process of and apparatus for purifying waste gases. Fux, W. **792 603**

Microcrystalline wax compositions. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. **792 581**

Electrolytic production of the metals titanium, zirconium, hafnium, vanadium, niobium, tantalum, chromium, molybdenum or tungsten. Norton Grinding Wheel Co., Ltd. **792 716**

Protective coating of metallic surfaces. Huet, A. **792 849**

Manufacturing process. Imperial Chemical Industries, Ltd. **792 717**

Production of unsaturated hydrocarbons. Chemische Werke Hüls AG. **792 604**

Boron nitride-metal silicide bodies. Carborundum Co. **792 733**

Organopolysiloxane coating and polishing compositions. General Electric Co. **792 647**

Bituminous emulsions. Esso Standard Soc. Anon. Francaise. **792 648**

Degasifying finely-divided coal. Steinkohlen-Elektrizitat AG. **792 880**

Organic thiophosphoric acid derivatives, process for their preparation and compositions containing same. Soc. des Usines Chimiques Rhone-Poulenc. **792 608**

Alkyl orthosilicates by attrition milling. Union Carbide Corp. **792 853**

Cleaning and washing agents having bleaching properties. Hedley & Co., Ltd., T. **792 609**

Hydroforming. Esso Research & Engineering Co. **792 757**

Making (chloromethyl) styrene. Dow Chemical Co. **792 860**

Gas cleaning apparatus. Research-Cottrell, Inc. **792 588**

Preparing substituted amides and intermediates therefor. Naamlooze Vennootschap Nederlandsche Cocainefabriek. **792 791**

De-oxidation of aluminium surfaces. American Chemical Paint Co. **792 739**

Preparation of free-flowing flaked benzene hexachloride. Columbia-Southern Chemical Corp. **792 610**

Acrylonitrile polymers stabilised with certain β-hydrocarbonoxypropionitriles. Abbey, A. (Dow Chemical Co.). **792 855**

Hydroxylated benzophenone mixed ether process. American Cyanamid Co. **792 653**

Can coating compositions. Esso Research & Engineering Co. **792 891**

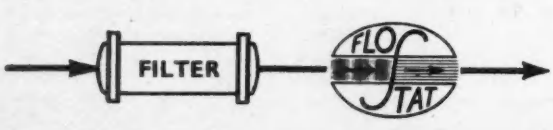
Water-soluble sulphonation products from copolymers of arylvinyltoluene and acrylonitrile. Dow Chemical Co. **792 611**

Separation of terephthalic and isophthalic acids. Mid-Century Corp. **792 612**

Carotenoids and the manufacture thereof. Hoffmann-la Roche & Co., AG., F. **792 593**

Equipment for removing and comminuting solids contained in liquids and more particularly in sewage. Passavant, W., Passavant, U., and Schramm, P., [trading as Passavant-Werke]. **792 741**

Flostats for Filter Efficiency



No matter what changes of pressure occur at inlet ***or*** outlet, the Flostat controls the flow at a constant rate.

The complete elimination of surge allows solids to be deposited lightly and evenly, so that the maximum amount of matter can be filtered out before efficiency is reduced by sealing.

A 30% increase of filter life is commonly experienced. Write now for further details.

SOLE MANUFACTURERS: **G. A. PLATON LTD.** Technical Service for Industry
323A, WHITEHORSE ROAD, CROYDON, SURREY. Telephone: THOrnton Heath 1631

TRADE NOTES

Decca Radar Ltd. and The Decca Navigator Co. Ltd. moved their London head offices to a new building, Decca House, on the Albert Embankment, on 28 February. Their address will be Decca House, Albert Embankment, London SE11.

New Q & Q Agency

Quickfit and Quartz, Ltd., laboratory glassware makers, of Stone, Staffs, have appointed Ralph Cuthbert Ltd., of Westgate, Huddersfield, as agent and stockist.

William Jessop Furnace Order

A consumable electrode arc-melting furnace has been ordered by William Jessop and Sons of Sheffield, from W. C. Heraeus of Western Germany through the UK agents, Fleischmann (London). The furnace, largest of its kind in Europe, will add to Jessop's existing vacuum-melting production plant.

Viaduct Alum Acquired

Viaduct Alum Co. Ltd., The Marsh, Widnes, has been acquired by the Marsh Alum Co. Ltd., as from the close of business on 21 February. All outstanding contracts and debts due are being transferred to Marsh Alum, who will also undertake responsibility for all liabilities outstanding at that date. The acquisition has taken place to facilitate reconstruction of Viaduct Alum Co. The Marsh Alum Co. will now be under the same control and shareholders as Viaduct Alum Co. Ltd. Secretary of both companies is Mr. S. Grahamslaw.

Sharples After-Sales Service

With the acquisition of an additional fleet of service vans, Sharples Centrifuges Ltd., Tower Works, Doman Road, Camberley, Surrey, claim to have improved their after-sales service. Control is from head office (Camberley 2601).

Welding Development

Increased production of welded cylindrical vessels with a wide range of sizes is now being obtained at the Barrow-in-Furness works of Vickers-Armstrong (Engineers) Ltd. with the aid of a Fusarc high-lift boom and traversing roller bed installation. The equipment is being used for the welding of rotary kilns, storage tanks, HP and LP heaters, rotary coolers, and for other cylindrical fabrications. Various plate thicknesses are welded, and the thicker sizes (up to 2½ in.) have a double 'U' preparation. All work is radiographed on completion.

DIARY DATES

MONDAY 3 MARCH

CS & Oxford University Alembic Club—Oxford: Inorganic Chemistry Laboratory. 8.14 p.m. 'Some isothermal reactions of free radicals studied by kinetic spectroscopy' by Prof. R. G. W. Norrish.

TUESDAY 4 MARCH

British Plastics Federation—London: 47-48 Piccadilly W1. 2.30 p.m. Meeting to discuss the provision of improved facilities for fabricators of p.t.f.e.

I Chem E—London: Hoare Memorial Hall, Church House SW1. 9.45. Spring meeting. 'A contribution to the theory and practice of granulation' by Prof. D. M. Newitt and J. M. Conway-Jones (9.50 a.m.). 'Gas liquid contacting in agitated vessels' by P. H. Calderbank (11.20 a.m.). 'The design of a simple mixer settler: a method of design by calculation giving automatic interface control' by J. A. Williams, L. Lowes and M. C. Tanner (2.10 p.m.) and 'High efficiency fibre filters for the treatment of mists' by G. Lowrie Fairs.

Institute of Petroleum & RIC—Chatham: College of Technology, Maidstone Road. 'Paint' by A. N. McKelvie.

SAC Midlands Section—Birmingham: The University. 6.30 p.m. Annual general meeting.

WEDNESDAY 5 MARCH

Incorporated Plant Engineers—Leicester: Bell Hotel. 7 p.m. 'Electrostatic filters' by M. Penrose.

SCI Food Group—London: 14 Belgrave Square SW1. 6.15 p.m. 'Relationship of chemical composition to quality in fruit and vegetables for canning' by D. Dickinson and 'The free amino acids of certain fruits' by L. F. Burroughs.

THURSDAY 6 MARCH

CS & Alchemists' Club—Glasgow: Chemistry Dept., The University. 4 p.m. 'Recollections and Serendipities' by Prof. Kathleen Lonsdale.

CS, RIC & SCI—Bristol: Chemistry Dept., The University. 6.30 p.m. 'Recent developments in the zinc industry in the UK' by S. W. K. Morgan.

Polarographic Society—London: Duke of York, Dering Street W1. 7 p.m. 'Some problems and anomalies encountered during investigations with a high sensitivity polarograph' by R. G. Stanton.

Royal Society—London: Burlington House, Piccadilly W1. 4.30 p.m. 'Electronic emission spectra of the carbon disulphide ion CS^+' by J. H. Callomon and 'Primary photo-processes in quinones and dyes' by G. Porter.

SCI Yorkshire Section—Leeds: Chemistry Lecture Theatre, The University. 6.30 p.m. 'The biogenesis of porphorins' by Prof. A. W. Johnson.

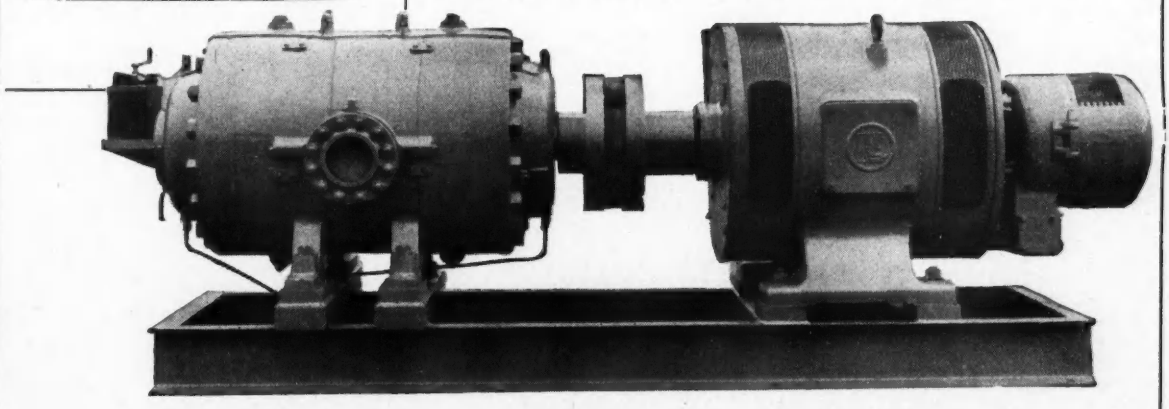
FRIDAY 7 MARCH

CS—Newcastle: Chemistry Dept., King's College. 5.30 p.m. 'Uses of radioactive materials in industry' by H. Seligman.

SERVICE FOR TODAY, FOR TOMORROW AND FOR YEARS AHEAD

HOLLAND-S.L.M.
ROTARY COMPRESSORS AND VACUUM PUMPS

Initial efficiencies maintained at low cost throughout years of continuous day and night service.



The B. A. Holland Engineering Co. Ltd.

15 DARTMOUTH STREET, LONDON, S.W.1

Telephone : WHI 2823 Telegrams : Picturable Phone London Works : SLOUGH, BUCKS

Classified Advertisements

CLASSIFIED RATES: All sections 5d. per word. Minimum 8/-. Three or more insertions 4d. per word. Box Number 2/- extra. Up to 10 a.m. Tuesday for insertion same week.
SEMI-DISPLAY: 30/- per inch. Three or more insertions 25/- per inch.
SUBSCRIPTION: Annual Subscription of 52/6 brings 52 weekly copies of CHEMICAL AGE direct to your address from the printer (postage paid by the publishers), and a copy of CHEMICAL AGE YEAR BOOK.
COMPANY MEETINGS AND REPORTS: £12.12.0 per column. Three column measure (approximately 360 words).

EDUCATIONAL

A.M.I.CHEM.E.—More than one-third of the successful candidates since 1944 have been trained by T.I.G.B. All seeking quick promotion in the Chemical and Allied Industries should send for the T.I.G.B. Prospectus. 100 pages of expert advice, details of Guaranteed Home Study Courses for A.M.I.Chem.E., B.Sc.Eng., A.M.I.Mech.E., A.M.I.Prod.E., C. & G., etc., and a wide range of Diploma Courses in most branches of Engineering. Send for your copy today—**FREE.** T.I.G.B. (Dept. 84), 29 Wright's Lane, London, W.8.

SITUATIONS VACANT

YOUNG GRADUATES required to work on Research and development problems in the fields of Adhesives and allied products, based on Rubber, Synthetic Rubber and Synthetic Resins. Previous industrial experience is not essential, but only men with drive and imagination need apply. Excellent prospects in rapidly expanding organisation. Five-day week. Pension Scheme. Applications in strictest confidence to: Managing Director, **EVODE LIMITED, STAFFORD.**

SEMICONDUCTORS LIMITED
require the following Chemists for production and development work on semiconductors:

(a) **PLANT CHEMIST** experienced in metallurgical and plating chemicals analysis, testing of water, greases, etc., and capable of applying his results.
Qualified to B.Sc., A.R.I.C. or equivalent standard.

(b) **ENGINEERING CHEMIST** to advise on the chemical aspect of production with particular reference to high purity water, gases, handling of acids, etc.
Qualified to B.Sc., A.M.I.C.E. or equivalent standard.

(c) **ASSISTANT CHEMIST** to advise on chemical solution preparation and production problems associated with variations in purity of chemicals.
Qualified to H.N.C. Inter. B.Sc., or equivalent.

These are interesting positions with considerable possibilities in a new field of development.

Please apply, giving details of age, experience and salary required to The Personnel Manager, Semiconductors Limited, 56 Vicarage Lane, Ilford, Essex.

FOR SALE

NEW DRUMS—surplus to requirements, 22 B.G. 9in. lids. Following quantities, sizes 560—16in. by 22in.; 2,750—14in. by 16in.; 1,990—16in. by 21in.; Polythene Liners—2,500—23in. by 32in. Prices: less than half cost. Contact: Steel Drums Ltd., 118 Burdon Lane, Sutton, Surrey. Tel.: Vigilant 6506/7.

Carboy Stands. Carboy Carriers. 40 gal. one-man drum lifters. Portable Rack for lifting and emptying carboys. **J. ABBEY LTD., WATTON, NORFOLK, PHONE WATTON 202.**

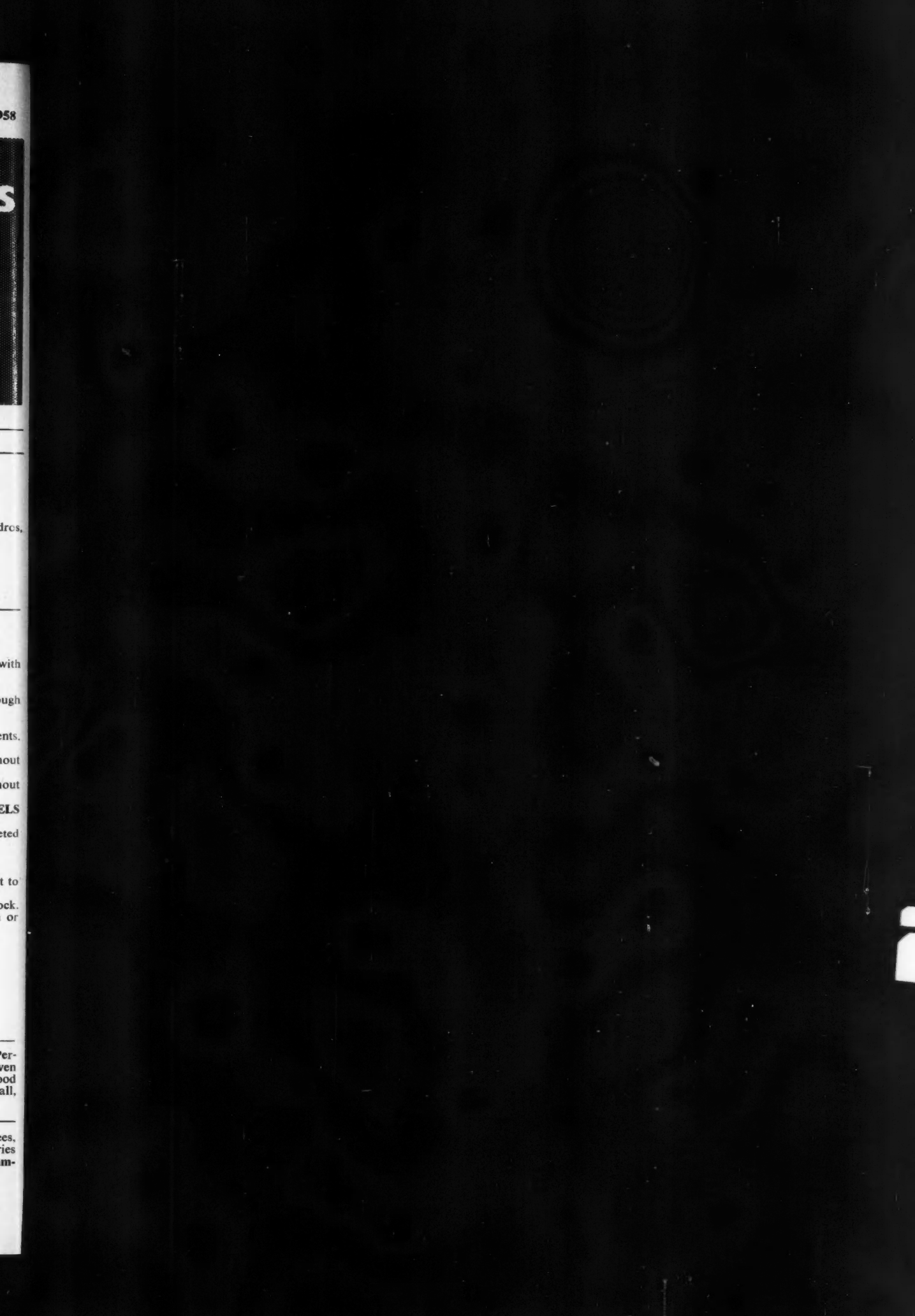
FOR SALE: continued

PHONE 98 STAINES
S.S. Cooling/Flaking Drum 4ft. by 4ft. 6in. 100 w.p.
(2) Heavy 'U' trough Mixers 7ft. by 3ft. 9in. by 7ft. deep.
(2) Alum. 1,400 gall. Vert. Cyl. Enc. Tanks.
New Stirring Arms ¼ up to 2 h.p.—26-480 r.p.m.
'Z' and Fin blade and Cyl. Mixers. Filter Presses, Hydros, Condensers, Stills, Pumps, etc.
Complete lists available
HARRY H. GARDAM & CO. LTD.,
100 CHURCH STREET,
STAINES

MORTON, SON AND WARD LIMITED
offer
HYDRO EXTRACTORS:
60in. and 48in. by **BROADBENT,** little used, complete with Igranic starters.
36in. by **BROADBENT,** belt driven. Could be motorised.
TWO 42in. by **WATSON LAIDLAW,** under driven through Vee ropes.

NEW UNITS in stainless or mild steel made to requirements.
CONDENSERS,
MIXING VESSELS, JACKETED PANS with or without mixing gear.
'MORWARD' 'U' shaped trough **MIXERS** with or without jackets.
TANKS: CYLINDERS: RECEIVERS: PRESSURE VESSELS and **AUTOCLAVES.**
TWO 600g open top and **TWO** 400g totally enclosed jacketed pans.
One 700g **VERTICAL DIGESTER.**
Stirring gear can be fitted to any vessels.
New portable **STIRRING UNITS** with clamp-on attachment to requirements.
New **MONO** Pumps and other second-hand pumps in stock.
AIR COMPRESSORS: motorised, from 5 to 60 c.f.m. with or without receivers.
RECEIVERS supplied to requirements.
Enquiries invited:
MORTON, SON AND WARD LIMITED,
WALK MILL,
DOBCROSS, OLDHAM
Lancs.
Phone Saddleworth 437

HYDRO EXTRACTOR, Broadbent Huddersfield Copper Perforated Basket 30in. diam. by 12in. deep. Underdriven pulleys 3in. face by 6in. diam. Bedplate 4ft. 6in. square. Good condition. **Thomson and Son (Millwall) Ltd.,** Millwall, London, E.14. Tel.: East 1844.

STEEL FLANGES (welding-on type) Fabricated Bends, Tees, Y-Pieces, Chimneys, Flues, Conical Hoppers, etc. Enquiries invited. **Pipe Fabricators (Stamford) Ltd., Easton, near Stamford, Lincs.** Telephone: Stamford 3464.

BOX NUMBERS: Reply c/o "Chemical Age" · Bouverie House · Fleet Street EC4.